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ARMY AL&T

SEPTEMBER–OCTOBER 2000

THE ARMY/NASA PARTNERSHIP

Secretary of the Army
Louis Caldera

NASA Administrator
Daniel S. Goldin

FACING THE FUTURE...TOGETHER

FROM THE ARMY ACQUISITION EXECUTIVE

Partnering For Success

Earlier this year at the Simulation and Modeling for Acquisition, Requirements and Training (SMART) 2000 Conference, I announced a partnership between the Army and the National Aeronautics and Space Administration (NASA). NASA's Associate Administrator of Aerospace Technology Dr. Samuel L. Venneri and Army Astronaut LTC Patrick G. Forrester joined me in making this announcement. The agreement, signed by Secretary of the Army Louis Caldera and NASA Administrator Daniel S. Goldin, leverages the advances and unique strengths of each organization. NASA has its Intelligent Synthesis Environment (ISE) initiative. The Army has SMART. With this partnership, we join in the mutual pursuit and application of advanced modeling and simulation (M&S) technologies to benefit our soldiers and our astronauts.

This issue of *Army AL&T* is largely devoted to the Army/NASA partnership. What stands out about this collaboration is that, independent of one another, both NASA and the Army charted a future that capitalizes on M&S tools and technologies. The harsh environments in which our soldiers and astronauts operate, in fact, demand that they train with new technologies in simulation. Our mutual work and investments will help each of us achieve our goals more quickly. I wish to highlight our common ground and the promise of cooperation.

Through this partnership, we are finding that our organizations have a lot in common, including the challenges we face. Among these are mission planning, rehearsal, and training, as well as conceptualization, design, and engineering of complex equipment. Here is where ISE and SMART are so vitally important. Without SMART, for example, the Army will not achieve the Future Combat Systems (FCS) in this decade. With NASA in mind, I view fielding FCS similar to President John F. Kennedy's challenge in 1961 to land a man on the moon before the end of the decade. President Kennedy's challenge was met in 1969. Many thought it impossible, but technology, collaborative engineering, and hard work made it happen.

Our challenges today are made easier by a long and productive history of working together. NASA and the Army are geographically collocated in several areas, we have six officers in the astronaut program, and we are already jointly pursuing technology development. If history is our guide, our new partnership is destined for success.

Army laboratories and engineering centers continue to exchange expertise and technology with NASA and are poised to reap great benefits from this partnership. NASA's Ames Research Center at Moffett Field, CA, is host to the Army's Aviation Research, Development and Engineering Center (RDEC), where both organizations pursue advanced aviation technologies such as intelligent agents that can reduce pilot task loading. In Huntsville, AL, NASA's Marshall Space Flight Center (MSFC) coexists with Redstone Arsenal, home of PEO, Aviation; PEO, Tactical Missiles; PEO, Air and Missile Defense; Redstone Technical Test Center; the Aviation and Missile Command; and the Space and Missile Defense Command. Our PEOs and deputies for systems acquisition are engaged in detailed discussions with MSFC officials on several issues, including rapid prototyping and the interface control documentation process. NASA's experience in developing and building the International Space Station will help us successfully implement in less time our system-of-systems approach to weapon systems development. At Langley Research Center in Hampton, VA, NASA and the Army Research Laboratory share world-class facilities for structures and materials research and other important endeavors. With these existing advantages, this partnership has unlimited potential.

The Army Materiel Command (AMC) is the executive agent for this partnership initiative and is working to identify potential areas for collaboration. The challenge lies not in identifying opportunities, but rather in deciding which ones to pursue first. Next April, the Army and NASA will co-host the 4th Annual SMART Conference, where we hope to demonstrate the results of the opportunities pursued by AMC and other Army organizations with NASA. Such potential collaborations include development of an RDEC federation in which simulation tools used throughout the different research centers and laboratories are linked in an interoperable manner to enable robust system-of-systems analysis.

NASA has expressed interest in the Army's Institute for Creative Technologies, where we are pursuing immersive virtual environment technologies. Because the Kennedy Space Center has tapped into the entertainment industry's ability to convert computer-aided design data to 3-D immersive visualization, there is potential for a three-way collaboration among the Army, NASA, and Hollywood. NASA has significant experience in robotics simulation, simulation-based sustainment planning, and in developing secure data exchange across the Internet. Each of these areas represents potential cross fertilization between the Army and NASA, particularly in light of the challenges we face in developing FCS. The possibilities are endless and the potential intriguing.

I'm looking forward to the initial results of this new partnership, and I invite you to work with me to make it a great success. I also challenge you to make a contribution in whatever way you can. This partnership is, after all, about collaboration and sharing technology, expertise, and experience. Our mutual accomplishments will enable our soldiers and our astronauts to receive better training, better equipment, and better protection so that they can face the harsh environments of the battlespace or outer space and return home safely.

Our Astronauts

Army astronauts play a key role in NASA's overall mission, especially now as they work to outfit and activate the International Space Station, a permanent laboratory in space for research on new, advanced industrial materials, communications technology, medical research, and more. We are proud of our astronauts' roles in making this possible. LTC Nancy J. Currie, with more than 700 hours in space, was the flight engineer on the first shuttle mission to carry hardware to space for assembly of the International Space Station. LTC Jeffrey N. Williams served last May on the crew of STS-101 Atlantis, the third mission to transport more than 5,000 pounds of equipment and supplies for installation on the station. COL William S. McArthur Jr. is in training for the shuttle launch scheduled in October to continue assembly of the International Space Station. LTC Forrester, mentioned at the outset, is assigned to Flight Crew Operations at the Kennedy Space Center in Florida. Previously, he served as the crew representative for robotics development for the space station. LTC Timothy J. Creamer recently completed 2 years of intensive space shuttle and space station training and is assigned technical duties at the Johnson Space Center in Texas. MAJ Donglas H. Wheelock served as the lead engineer for the International Space Station's element-to-element hardware fit checks. He is currently serving in technical assignments until assigned to a space flight.

Paul J. Hoeper

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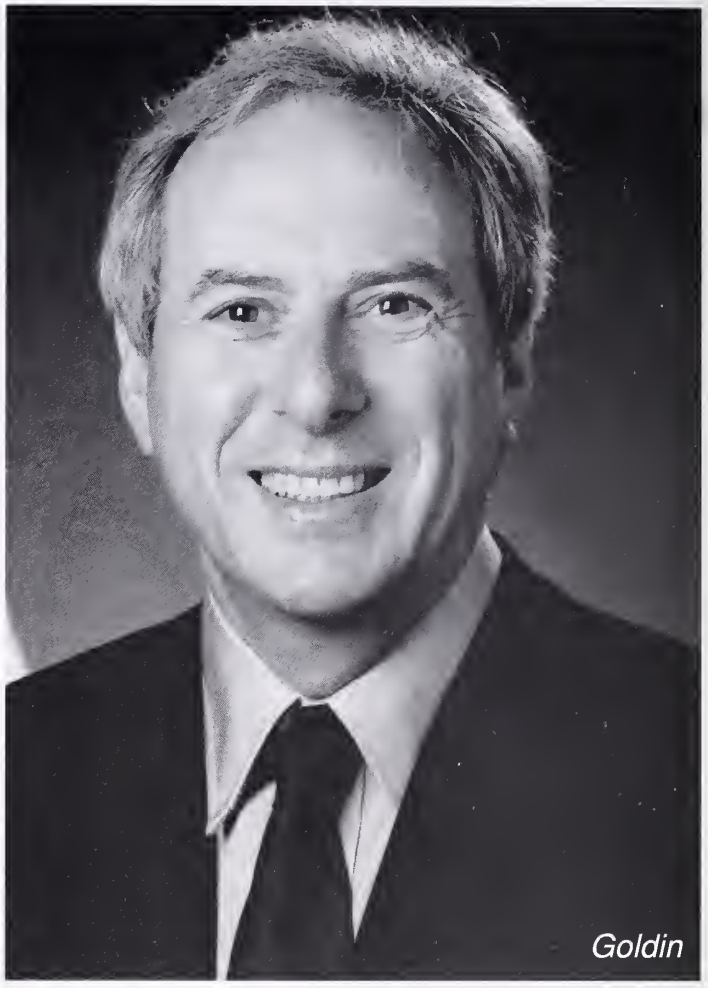
FEATURES

DEPARTMENTS

COVER

Despite differences in their missions, the Army and NASA believe that partnering efforts will prove to be mutually beneficial.


Caldera


Goldin

The Army NASA Partnership . . .

EXCLUSIVE INTERVIEW WITH SECRETARY OF THE ARMY LOUIS CALDERA AND NASA ADMINISTRATOR DANIEL S. GOLDIN

Debra L. Fischer and Cynthia D. Hermes

Editor's Note: Faced with some remarkably similar challenges in terms of new systems development and training, the Department of the Army and NASA joined in a Memorandum of Understanding partnership earlier this year. The purpose is to provide a basis for cooperation in areas of common technological benefit by leveraging the unique strengths of each organization. The following exclusive interview details some of the technologies involved in this partnership and what the participants hope to achieve.

***Army AL&T*: The Army must be able to deploy and sustain forces and equipment in harsh environments anywhere on Earth while NASA must be able to deploy and sustain astronauts and equipment in the harsh environment of outer space. With this in mind, the Department of the Army and NASA recently entered into a new partnership. What is the purpose of this partnership and what do you hope to accomplish?**

Caldera: The purpose of this partnership is to help each of our agencies leverage the other's investments so that we can better achieve our respective missions. There are numerous initiatives that each agency is working on that have cross application, and collaboration can fuel the creative process. Ultimately, this will help us find new ways of conducting business that will improve everything from weapons development to mission rehearsal to the quality of our simulations and war games. Today, because of so much

technological change in the world, we should leverage the achievements of others. Thus, the Army can avoid wasteful investments in duplicate efforts, especially if others are much further ahead or have a unique expertise in a given area. Collaboration can definitely advance breakthroughs in technology.

Goldin: I believe that we have a natural partnership because we do similar things and we can learn from each other. The primary difference is that the Army is concerned with extreme environments on Earth while NASA is concerned with extreme environments in space. Our different perspectives will really lead to maximum learning for both organizations. Additionally, distance and time are important to both of us. For NASA, distance is measured in millions and billions of miles. Time at the speed of light to Mars is 20-40 minutes round trip, and NASA is concerned about time delays. For the Army, distance is measured in thousands of miles, and a time delay of seconds can also be a concern. So, we have the same type of mission but different concerns. Because of this, Secretary Caldera and I felt that there was enormous potential in establishing an Army/NASA partnership. Working separately, each of us will need more resources and progress will take longer. Working together, however, and with shared resources, we can move faster and better protect our astronauts and soldiers.

Working separately, each of us will need more resources and progress will take longer. Working together, however, and with shared resources, we can move faster and better protect our astronauts and soldiers.
—Goldin

***Army AL&T*: An intent of this partnership is to identify areas where one agency is already investing money and the other agency is not, thus increasing the return on investment of each agency's existing funds. Who do you foresee as the ultimate beneficiary of this partnership, and do you envision it expanding to other departments and agencies?**

Goldin: The ultimate beneficiary will be the American public. In the 1992, 1994, 1996, and 1998 elections, Americans clearly indicated that they want a government that does more and costs less. So, this is a partnership made in heaven. Others who will benefit even more directly will be the soldiers in the field and the astronauts in space. These are the people we must care for and, because of this partnership, they will have better equipment and be better trained more quickly and for less money.

Caldera: I also believe this is a win-win opportunity for both the Army and NASA. I might add that other military departments and nongovernmental agencies have expressed interest in being a part of this type of collaborative effort. Ultimately the winners are our soldiers and the American people. The American people will benefit by having better-trained, better-prepared, and better-equipped soldiers to provide for our Nation's security. Our soldiers, who are America's sons and daughters, will benefit because they will have improved survivability on future battlefields.

***Army AL&T*: Army astronauts have taught us that they must train on Earth to prepare for missions in outer space. Likewise, soldiers must train to prepare for the unknowns of the battlespace. What role will Army astronauts have in the partnership, and will soldiers have a similar role?**

Caldera: I think there's a lot we can learn from the experience of Army astronauts because they have been training in simulated environments, in operating the space shuttle, and in building and manning a space station. Similarly, we can learn a

lot from our soldiers because of their involvement in the weapons development process. If they can operate a weapon system in a virtual environment, they can provide insight on whether the system's control panel is in the right place; whether it's easy for the soldier to maneuver; whether their view is obstructed; and if there are any potential problems in loading, aiming, and firing the weapon. All of this can be learned from a soldier who has used a virtual weapon system that employs such things as 3-D goggles and virtual-reality gloves. Additionally, with soldier participation in modeling and simulation efforts, the Army will be able to develop more user-friendly information workstations. Hopefully, this will also prove beneficial to NASA.

The Army and NASA can also benefit from the experiences of soldiers who have grown up using the technology in video games. They've learned how to use a toggle switch and how to fire in multiple directions with two hands at the same time, and their brains can integrate all of that. Soldiers familiar with computer technology don't necessarily have to watch their hands to use this technology.

Goldin: Simulation is becoming a much more important aspect of training. For example, 50 years ago soldiers basically learned to take apart a jeep, put it back together, and save Americans. That was basic to their training. Today, modern soldiers must have unbelievable technical skills (engineering, computer, and high-technology capability). Unfortunately, there are young men and women entering the Army out of high school who have never been exposed to these technologies. The best way to prepare them for the battlefield of the future, to protect their lives, and to ensure American victory and force projection is to provide them the best possible training. This can be achieved through realistic simulations. Simulations will also allow us to resolve problems with our weapon systems before we even start building hardware. So, there's a huge impact. Astronauts have learned this method of operation, and I believe it will also be of great value to the Army.

I was recently in Houston with the President's Science Advisor. We put on spacesuits, went through a simulated launch in the space shuttle, and experienced some of the problems that might occur during a real flight. For example, we simulated vibration and noise and used virtual reality to look out cockpit windows. I thought I was on a real flight and even had some sense of tension and the passage of time. Our astronauts simulate 2 hours on the ground for every hour in space. Having them work with virtual-reality tools will certainly help us better deal with mission preparation because they've been there.

***Army AL&T*: The success of this joint endeavor undoubtedly depends on the unique strengths of each of your organizations. What are the unique strengths that your organization brings to this effort?**

Goldin: The Army has a great deal of experience in dealing with some very significant issues having a national and international impact. In addition, the Army has tremendous experience in training because of the large numbers of military personnel who change duty stations every few years. In particular, the Army has a lot of experience in field simulations. As a result, the Army has very sharp training tools.

NASA has a tremendous amount of experience in state-of-the-art immersive environment technology. This technology provides a truly realistic surrounding beyond that where individuals merely look through a screen. NASA personnel have very advanced, cutting-edge skills in information technology, nanotechnology, biotechnology, and distributed communication systems.

I believe that the assets of both of our organizations, in combination, result in a winning team.

Caldera: The Army has used modeling and simulation across many different disciplines, including development and acquisition programs, training programs, and mission-rehearsal programs. There is a lot of learning going on in the Army. Another strength is that the Army is about people, leadership, and teamwork. So, our natural impulse is to share, to benefit from, to educate, and to spread our knowledge. This makes us a good partner, both internally and externally with NASA and other organizations.

I think that another of the Army's greatest strengths is that our people "get it." They understand the value that modeling and simulation and advancements in technology can bring to our programs and to our soldiers. Our people also believe that partnerships will ultimately benefit the soldier.

***Army AL&T*: Joint development of simulation technologies is reportedly an important aspect of this initiative. How will advancements in this particular area of concentration benefit your organization?**

Caldera: The Army and NASA are trying to tackle many of the same issues—everything from robotics to miniaturization to mission rehearsal. In addition, some equipment can *only* be developed and tested in a simulated environment because the first time it is put into space or employed by a soldier—whether it's a missile shot or firing at an incoming missile—it has to work. It has to be fail-safe. Thus, simulation technology is one of the greatest benefits.

Goldin: Today, most of our virtual space is on a two-dimensional screen, and interaction is achieved via a keyboard. Eventually, I believe we will have a fully immersive virtual capability or multidimensional environment that incorporates sight, sound, and touch. We will get a more realistic simulation of what we have. Currently, with today's technologies, we are limited to the geometric configuration of objects. The realism provided by simulation enables us to do a better job of developing the required hardware and software. In addition, simulation allows us to literally test in virtual space before we build. This reduces cycle time and improves equipment effectiveness. More realistic simulations will also improve equipment training, quality, and fidelity. All of this will benefit the Army/NASA team.

***Army AL&T*: Effective and efficient collaboration between researchers in each of your organizations is an absolute must. We know that the strong link of collaboration and sharing information makes good business sense. How will you ensure that this happens?**

Goldin: We will ensure this by having our people plan clearly, separate and define tasks (that is, everyone doesn't have to do everything), establish precise lines of communication, and really get to know each other—not by just zapping each other e-mails but by meeting face to face. Dr. Samuel L. Venneri, Associate Administrator of Aerospace Technology at NASA, has been working very closely with his Army peers, but we're going to need even more vigorous interactions during the coming years. I view this as key to the partnership. If you watch a house being built, contractors work on the foundation for months and it looks as though nothing is happening. Then suddenly, the house rises. We're going to take the time to build the foundation and then we're going to go do all the exciting things.

Caldera: I am confident this will happen because we have commitment at the highest levels throughout the Army to make this partnership work. We also have a good foundation in place already because we are collocated with NASA at Ames Research Center in California, Langley Research Center in Viriginia, and at Redstone Arsenal at the Marshall Space Flight Center in Alabama. Folks in these places are already working together to take advantage of this partnership. I am also confident that collaboration will be greatly improved by sharing knowledge and technical data between the Army and NASA. As you know, we first announced the partnership this past January at the Army's Third Annual Simulation and Modeling for Acquisition, Requirements and Training

[SMART] Conference. We have asked NASA to co-sponsor our fourth conference as a means to foster this sharing and exchange between the two organizations. This, in turn, will help the Army share information among its own agencies. Although many people are working on the same program, it's not necessary for everyone to gather in the same building around the same computer to work on different parts of the same program simultaneously. Ideally, access to data and advancements can be provided at different sites.

This partnership gives the people involved an opportunity to collaborate in a way that is very exciting for our people because they get to learn from others. One of the challenges for the government is keeping skilled technology workers. Although we can't pay them enough to compete with the private sector, we can give them tremendously challenging assignments. If they can work on cutting-edge applications and collaborate with others who are also working on cutting-edge applications, that helps make the job exciting and rewarding. The fact that Army technology workers can help the Army while also helping the space program creates an exciting knowledge-worker environment that the Army wants.

***Army AL&T*: What specific types of technologies will your researchers exchange?**

Caldera: They will share the ability to distribute virtual-reality-designed applications, the ability to have people simultaneously look at and work with the same kinds of designs and applications, and the ability to use the immersive virtual-reality training environments. Robotics and

miniaturization technologies will become increasingly important to the Army as part of equipment such as our Future Combat System. This will reduce our life-cycle equipment costs. Traditionally, we've had to turn and bend metal on individual component parts, test vehicles to see which component would break first, then figure out how to replace or strengthen that component.

Goldin: We expect to exchange a broad range of information technologies, such as very advanced computational engines, a field I call soft computing. Current information systems are based on very logical, sequential, and rational steps. They require writing individual lines of code with instructions and then checking all of them. The procedure entails an enormous amount of energy and people and is prone to error. A study in the mid-1990s indicated that of 8,000 software projects in industry, only 16 percent were successful. Additionally, there are 5-10 errors for each 1,000 lines of code in commercial software. This is intolerable for NASA and the Army. When human lives depend on it, it's one strike and you're out. We don't have the luxury of a second chance. So, we're working on attaining ultra-high-assurance software, an area I consider essential. We must have an unprecedented improvement in software productivity because our programs now involve millions of lines of code and, in the future, they will involve tens of millions of lines of code. There aren't enough software coders in the world to handle these programs.

We must develop software that literally learns and thinks. We need software that, when boundary conditions are entered, writes its own code, checks it out, and keeps on learning in a simulator. This will be a very important tool. Again, we call this soft computing. Neural-nets, fuzzy logic, model-base reasoning, and genetic algorithms are some of the technologies we're developing at the NASA Ames Research Center. The two main types of technologies are high-assurance software and soft computing.

We also intend to develop immersive technologies. We need multidimensional displays that don't require cyberglasses and excess tools. We need virtual sound and force fields so people can feel the force of a gear shift or the force of pushing against a wall in virtual space. We need to bring in smell, heat, and the ability to feel temperature changes. We also need to develop geographically distributed systems and be able to communicate with these systems so we don't have the terrible interface problems we're experiencing today. These total immersion technologies are very crucial.

***Army AL&T*: Do you have any concluding comments?**

Goldin: I'm very excited about the partnership. We've had nothing but positive experience with the Army's military and civilian personnel and have found them to be candid, quick, and bright. They're focused on a goal and we're focused on a goal. Our goals may have different outcomes, but we're finding a lot of similarities between the battlefield and space. I think this partnership is going to be a shining example of what can be done. Now we've got to execute it by taking the time to build the foundation, set it up correctly, and then move out.

Caldera: This partnership isn't limited to leveraging technology that will result in better equipment and training for our soldiers. It also demonstrates that the Army is a technology-oriented organization that will attract the young people we need in the Army as soldiers, officers, and leaders. Young people will be interested in serving in the Army because of the technology they will be able to use. So, the partnership has broad applications. Technology is impacting our military just as much as it's impacting every other segment of our society. The same technology that can help humankind reach for the stars will also help us spread the blessings of freedom and liberty to the four corners of the world.

Technology is impacting our military just as much as it's impacting every other segment of our society. The same technology that can help humankind reach for the stars will also help us spread the blessings of freedom and liberty to the four corners of the world.
—Caldera

U.S. ARMY: ON POINT AGAIN IN NEW FRONTIERS

LTG Paul J. Kern and Ellen M. Purdy

Introduction

In early May, Army astronauts COL Jim Voss (now retired) and LTC Jeff Williams executed a major step in a technical collaboration of an unprecedented scale. This collaboration is the International Space Station (ISS) and is an endeavor that involves 16 countries building various components that will make up the completed station. Voss and Williams spent more than 6 hours on a spacewalk conducting a variety of assembly and maintenance tasks on the ISS as part of space shuttle mission STS-101. Their extravehicular activity is the 5th spacewalk conducted in the ongoing construction of the station and the 85th spacewalk by U.S. astronauts. COL Voss will continue his participation in the ISS effort as part of the second crew scheduled to inhabit the station in 2001.

Just as U.S. Army officers and soldiers were on point in opening the western frontier in the 1800s, Voss and Williams are on point in opening up the frontier of space. And, just as we asked our soldiers and officers to man outposts on the edge of the western frontier, we are continuing the tradition of helping secure another frontier.

Opening the frontier of space, by its very nature of requiring technical collaboration, means Voss and Williams are also on point in another frontier—the digital information age. The Army can be proud of the continuing contributions its officers are making on the ISS and can learn from the experiences of its astronauts.

Army/NASA Partnership

Prior to the STS-101 spacewalk, the Army entered into a partnership with NASA to exchange digital information technology and expertise. The impetus behind this partnership was the realization by personnel of both organizations that there are many parallels to how each organization goes about conducting its own mission. Although the Army and NASA missions are vastly different, the same technology and knowledge can be applied to both, and that is what the partnership is all about.

Because Army astronauts are the common link between the two organizations, they play a key role in this partnership. These astronauts have a foot in both camps. Thus, they understand the strategic and tactical world of the Army and its role as protector of national security. They understand the scientific and exploratory role of NASA in its quest to reach the planets and comprehend the unknowns of space. They also understand, better than most, how the Army and NASA can exploit digital information age tools in their respective roles as national security provider and planetary/scientific pioneer.

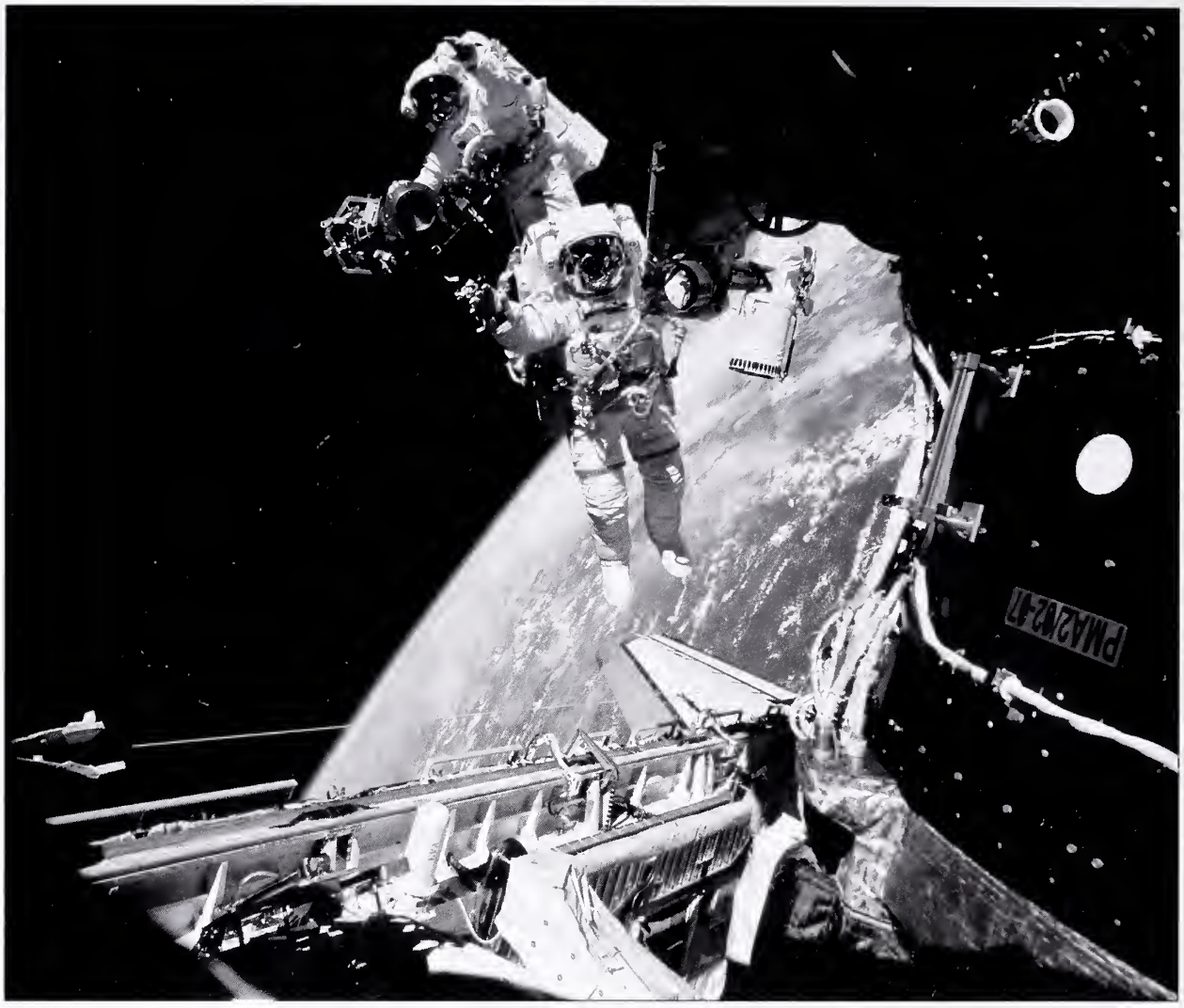
The genesis of the partnership was the discovery that NASA and the Army, independent of one another, chose an identical strategy for achieving their visions. The Army vision (the Objective Force) is for a more deployable, lethal force that is much less logistically burdened than today's fielded forces. NASA's vision is one of humans working and living in space and, ultimately, stretching the borders of the frontier to other planets. The Army's strategy for achieving its vision is Simulation and Modeling for Acquisition, Requirements and Training (SMART). NASA's strategy for human presence in space is its Intelligent Synthesis Environment (ISE). Basically, both the SMART and ISE initiatives capitalize on digital information technology (especially modeling and simulation tools) to design, build, deploy, operate, and sustain complex systems that enable each organization to successfully complete missions in potentially life-threatening environments.

Initiatives And Challenges

Digital information technology is key to each SMART and ISE initiative. Each organization is engaged in missions that are more complex than ever, and the systems needed to conduct those missions are at a level of complexity beyond the capacity of any one person to totally comprehend. The scope of this complexity is what drives the strategies of both the Army and NASA. The systems being built (i.e., the Army's Future Combat System (FCS) and the ISS) require a level of collaboration that has never been attempted in either organization. For the Army to successfully build the Objective Force, it must field new hardware. In addition, the Army must address the concomitant issues of force structure; doctrine; tactics, techniques, and procedures; supportability; training; etc. Furthermore, all stakeholders must work together in a more integrated fashion. As a partner in building the ISS, NASA must wrestle with similar issues of deploying new hardware, developing new procedures (remember, things in a weightless environment do not respond the same as they do on Earth), supportability, training, etc. Additionally, NASA must deal with the issue of working with international partners who come from different cultures and political philosophies.

After considering the nature of the challenges each organization faces in its endeavors, it's easy to see why the Army/NASA partnership makes sense. There is no point in each organization going it alone when just the technical challenges themselves are mind boggling, let alone trying to accomplish all this within constrained budgets. Already having personnel who bridge both organizations gives us an advantage in making this partnership successful. Because Army astronauts do not have the opportunity to train live, and because they are engaged in the highly technical endeavor of space exploration, they have been forced to rely on simulation technology (often to a greater extent than their counterparts in the operational Army). Nearly everything Army astronauts do, from choreographing a spacewalk, to learning how to operate the Russian-built crane on the ISS, to maintaining the ISS communication systems antennas, is based on simulation. Frankly, there is no other way for them to do it—what a bonus for the U.S. Army!

Because astronauts operate on the frontiers of space and in the digital information age, the Army can leverage their expertise and knowledge. Astronauts have a history of anticipating and quickly solving problems in the real world because they have encountered them in a virtual world. They know how to exploit simulation for mission planning and mission rehearsal. Let's compare notes and see if the Army can gain something from the



STS-101 astronauts Jeffrey N. Williams (bottom) and James S. Voss work with the newly delivered main boom of the Russian crane (Strela). The two were later successful in attaching the boom to its operator post.

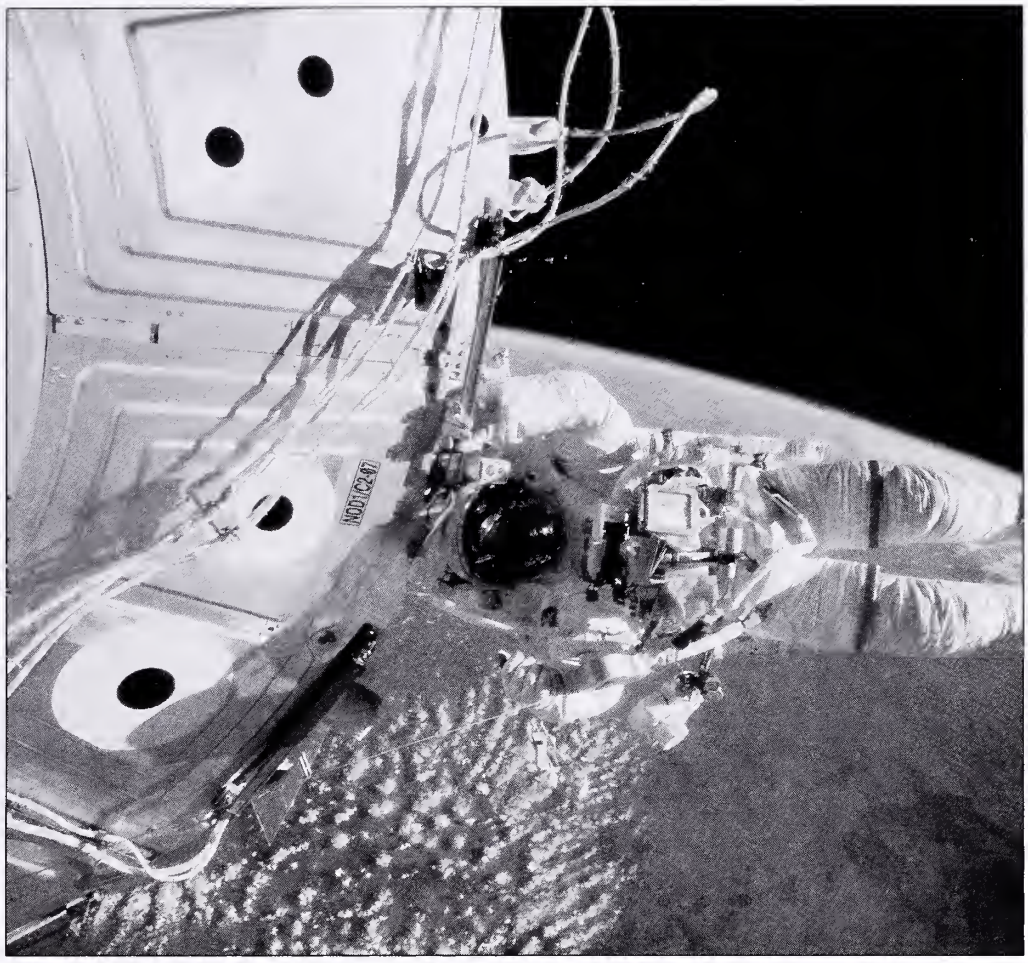
astronauts' experiences and, in turn, if the Army can teach something to NASA.

The Army is looking to build an Objective Force that includes embedded training and embedded course of action (COA) analysis. Before we fully develop our strategies to accomplish this, let's ask our astronauts. They already have a platform equipped with embedded training and COA capability—the space shuttle. Army astronauts already know how to use the same simulations they train with on Earth to help them conduct COA analysis to solve unexpected problems encountered in space. Before we tackle this for the Objective Force, let's ask them about their experiences in what works and, maybe even more importantly, what doesn't.

Army astronauts can help us build our FCS. Although we are in the concept exploration stage for FCS, we are very interested in the use of robotics. Army astronauts have a wealth of experience with robotics and robotics simulation. Let's tap into that so we can make more informed decisions about what will work best for FCS. While we are at it, let's also maintain a dialog with our Army astronauts who pilot the space shuttle.

STS-101 was the first mission to use a space shuttle equipped with the new "glass cockpit." The variant on the space shuttle Atlantis sets the stage for NASA's planned "smart cockpit," which it expects to have fielded by 2005. The idea behind the smart cockpit is to enhance cockpit display and incorporate intelligent agent technology to assume some of the burden of deductive reasoning required for a pilot to respond to a problem. What can we learn from NASA that we can incorporate in FCS so that we do not inappropriately task-load soldiers operating the FCS?

Army astronauts also have experience as users working hand in hand with engineers and scientists who are designing and building the ISS. This is the same type of collaboration we must achieve if we are to successfully grapple with the complexity of the system of systems that will be the Objective Force. Let's ask our Army astronauts how we can use simulation technology to bring the soldier into the acquisition process so that we field hardware in the Objective Force that is suitable and effective. In the past, the acquisition community tended to concentrate on system cost, schedule, and performance and left it up to the operational community to figure out how best to train, sustain, and employ the system in a combined arms and joint



STS-101 astronaut Jeffrey N. Williams, Mission Specialist, appears suspended over Earth in this 70mm photograph documenting part of the 6-hour, 44-minute spacewalk he shared with astronaut James S. Voss, which began May 21 and ended May 22, 2000.

environment. We can no longer afford this approach.

Because of the challenges associated with building a technologically complex system such as the ISS in partnership with other countries, NASA is looking to simulation technology to overcome geographical and temporal boundaries. It is expensive for NASA and its partner countries to send astronauts, scientists, and engineers on extended travel to conduct training, system integration, and test and evaluation, all of which are part of the process of building the ISS. One endeavor that NASA is pursuing in which the Army is also very interested is collaborative environments, where stakeholders address training, design, testing, etc., through virtual prototypes distributed across geographic borders and time zones. Rather than the Army or NASA working separately to solve the technology and process challenges associated with collaborating through simulation tools, it is a win-win story for both the Army and NASA if they can work together.

Conclusion

Partnership is really the only sensible path forward for the Army and NASA. Each organization is facing unknowns never before encountered. The Army is tackling how to define its role as a protector of national security in a post-Cold War, digital information age where the threat is no longer clearly defined. Further, the Army is being asked to do more than just fight the Nation's wars. NASA is facing the challenge of pushing the boundaries for humans in space, where we really do not know what we do not know. Collaboration will make each organization successful, and digital information technology will make that collaboration possible. We have a resource available to us, now let's figure out how to make the most of it.

LTG PAUL J. KERN, as the Military Deputy to the Assistant Secretary of the Army for Acquisition, Logistics and Technology, is the Senior Military Advisor to the Army Acquisition Executive and the Army Chief of Staff on all research, development, and acquisition programs and related issues. He supervises the Program Executive Officer system and serves as the Director, Army Acquisition Corps.

ELLEN M. PURDY is leading the transition of the SMART mission to the Army Model and Simulation Office. Upon completion of this special assignment, she will report to the FCS Program Management Office as the Manager for Test, Analysis, Modeling and Simulation. She has a master's in engineering management and a B.S. in chemical engineering.

ARMY ASTRONAUTS ENERGIZE THE NASA MISSION

LTC Patrick G. Forrester

"Man must rise above the Earth—to the top of the atmosphere and beyond—for only thus will he fully understand the world in which he lives."

—Socrates, 500 B.C.

Introduction

Late in the evening, May 21, 2000: the U.S. Army truly owns the high ground. At that moment, 250 miles above the Earth, 100 percent of the human beings "walking" in space belonged to the U.S. Army. On that special night, LTC Jeff Williams and COL Jim Voss (USA, Ret.) departed the protection of the space shuttle Atlantis to enhance the International Space Station (ISS). This all-Army extravehicular activity (EVA) is a prime illustration of the role that Army astronauts have come to play in the Army/NASA partnership as we continue together to explore the boundaries of space.

The U.S. Army has always had a proud tradition of contributing to our Nation's space program. In 1956, the Army Ballistic Missile Agency was established at Redstone Arsenal, AL, to develop the Jupiter intermediate-range ballistic missile. On Jan. 31, 1958, an Army Jupiter C rocket placed Explorer I, the United States' first satellite, into orbit. Three years later, Army Mercury-Redstone rockets launched Alan Shepard and Virgil I. "Gus" Grissom on suborbital space flights. In 1958, NASA was established, and, 2 years later, the entire Army Ballistic Missile Agency was transferred to NASA to become the nucleus of the agency's space program. The Army has been on the front line of human space exploration ever since.

Selection History

Since the beginning of the space shuttle program, there have been 10 groups (or classes) of astronauts selected for spaceflight. All but two of them have included an Army officer. And yet, to this day, most of the people we come in contact with are surprised when they find out we belong to the U.S. Army—that the Army even has astronauts! When the average person thinks of the Army, their first thought is of an Airborne Ranger infantryman who wears camouflage, uses high-tech weapons, and deploys overseas. We are not a whole lot different from that, except that we have traded in our camouflage for NASA blue, our high-tech weapons for the space shuttle, and most of our deployments these days are to Russia where we work with our cosmonaut counterparts to construct the ISS. It actually makes a lot of sense. The military experience we have acquired over the years—organization, teamwork, leadership, being able to "make do" with limited resources—has a direct application here at NASA.

The Army Astronauts

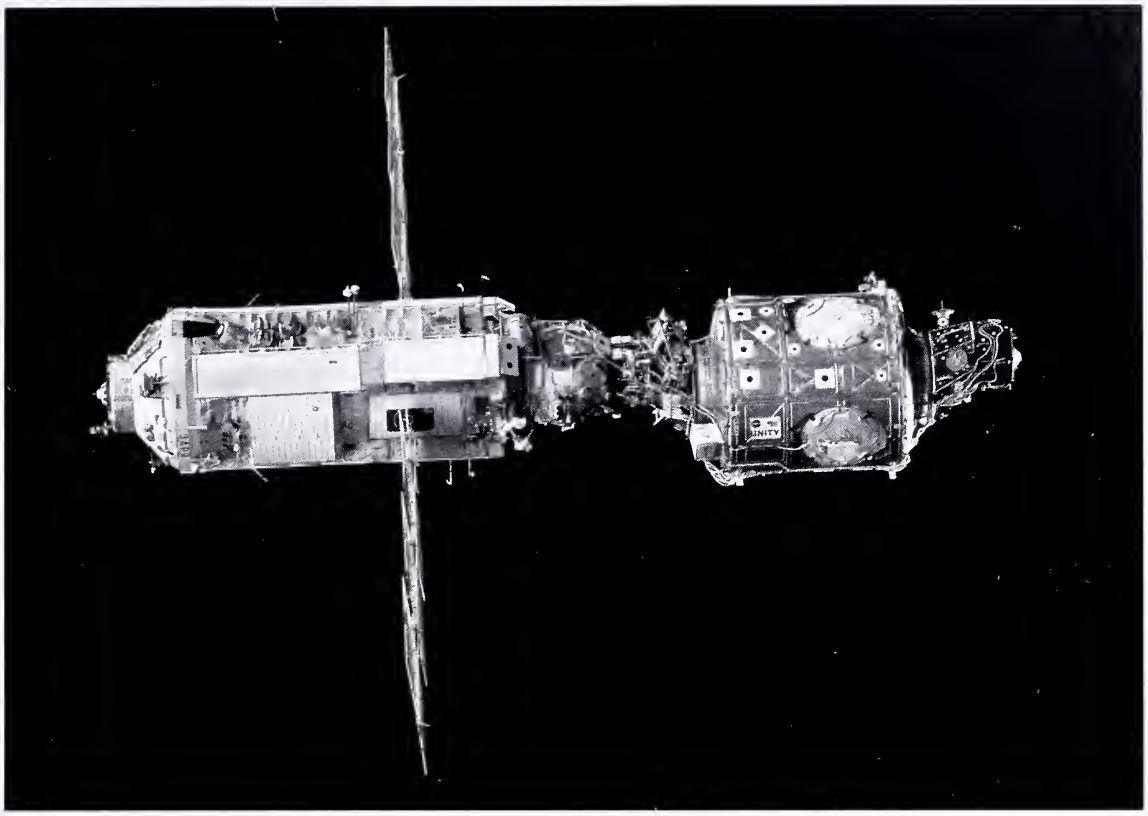
The NASA detachment, which includes six Active duty Army astronauts, is located at the Johnson Space Center, Houston, TX. It is part of Army Space Command in Colorado Springs, CO, which is subordinate to the U.S. Army Space and Missile Defense Command (SMDC). I recently took command of the detachment from Senior Army Astronaut COL Bill McArthur to allow him to train for his upcoming shuttle mission. The other Army astronauts are Williams, LTC Nancy Currie, LTC Doug Wheelock, and LTC "TJ" Creamer. The detachment helps the Army define its requirements for the space program and enhances the Army's use of space capabilities. Ultimately, these soldiers are Army and SMDC ambassadors to NASA.

As mentioned above, the Army has long been a key player in NASA's space shuttle program. The first Army astronaut, then COL Robert Stewart, orbited the earth in February 1984 on STS 41-B, where he became one of the first astronauts to maneuver untethered outside a spacecraft. However, the success in the shuttle program is just the beginning. The space shuttle and two types of Russian rockets will conduct 45 missions to launch and assemble the more than 100 elements that will comprise the completed ISS. In all, 460 tons of structures, modules, equipment, and supplies will be placed in orbit by 2004. The ISS is the largest international cooperative space effort in history and, again, Army astronauts are playing a key role as they help with its construction and habitation.

Currie flew on the first U.S. station flight, STS-88, which launched a key module during the construction of ISS. She was responsible for the mating of the U.S.-built module Unity with the on-orbit Russian-built module Zarya using the shuttle's robotic arm (photo on Page 11). As mentioned previously, Williams and Voss flew on STS-101, using their skills to replenish the fledgling space station. At the time I wrote this article, McArthur was scheduled to fly on STS-92 in September 2000. During this key construction mission, he will participate in an EVA to help with the assembly process. Voss will also be part of the Expedition Two crew to live and work aboard the ISS. This mission is scheduled for 2001 and is expected to last about 5 months.

Training And Other Duties

Although flying in space is the epitome of an astronaut's career, the actual time spent in orbit is rare. In fact, during a 10-year assignment with NASA, an astronaut will probably only fly in space about three times. Obviously, there is much more to being an



The U.S.-built Unity connecting module (right) and the Russian-built Zarya module (left) comprise the ISS.

Obviously, there is much more to being an astronaut than spaceflight. Despite the complexities of the job, an astronaut's ground duties can be broken down into two major categories: training for spaceflight and serving as a technical expert in some portion of the space shuttle or space station programs.

The technical jobs are numerous and varied, and much like an Army assignment, the Chief of the Astronaut Office will rotate the astronauts to help broaden their experience. For example, Currie is the Chief of the Robotics Branch of the Astronaut Office. Similar to a program manager, she is responsible for the engineering, development, and training of all robotic systems for the space shuttle and ISS. I am responsible for all crew training and onboard procedures for the space shuttle program. Wheelock spends most of his time in Russia where he oversees the development of Russian hardware and procedures for the ISS. Creamer focuses on the command and control software and oversees the international integration of the computers and networks onboard the ISS.

Training time is coveted and always welcomed when it appears on a usually overbooked schedule. When not assigned to a flight, an astronaut receives training designed to maintain proficiency for spaceflight and usually includes specific mission-task training. For example, it might include training on the remote manipulator system (the robotic arm on the shuttle) or training for spacewalks, which NASA calls EVAs. They also train on each of the shuttle and the space station systems. Each astronaut maintains flight proficiency in the T-38N jet training aircraft. With the recent cooperative effort to build the ISS, Russian language training has become a must. Finally, with what little "free" time is left, the astronauts are expected to maintain a high level of physical fitness.

Public Relations

Another commitment for the astronauts is that of public relations. With thousands of requests for astronaut appearances coming to the office on a regular basis, one must pick and choose where they spend their time. Army astronauts are well aware that their opportunity to serve in such a challenging and prestigious assignment is the result of a lot of hard work and commitment by others. As such, they feel obligated to "give something back" to those responsible for making it all possible. Thus, giving back to the Army is always a top priority. Army astronauts also appreciate the support provided by the Army leadership. For example, the night before her first shuttle mission in 1993, Currie received a fax from then Army Chief of Staff GEN Gordon R. Sullivan. He wrote: "Your craft will never be out of sight of an American soldier serving somewhere in the world." That is a fact that we never forget.

Conclusion

Space is the ultimate high ground and, as recently demonstrated, the Army's soldier-astronauts are leading the way. Our goal will always be to ensure space technology is there to support our fellow soldiers, the Nation, and the world in this new millennium.

LTC PATRICK G. FORRESTER is the Crew Training and Onboard Procedures Representative for the Astronaut Office at the Johnson Space Center, Houston, TX. He has a B.S. in applied sciences and engineering from the U.S. Military Academy and an M.S. in mechanical and aerospace engineering from the University of Virginia. Forrester was assigned to NASA at the Johnson Space Center as an Aerospace Engineer in July 1993 and was selected as an astronaut by NASA in May 1996.

EXPANDING THE ARMY/NASA/INDUSTRY AVIATION S&T PARTNERSHIP

Andrew W. Kerr

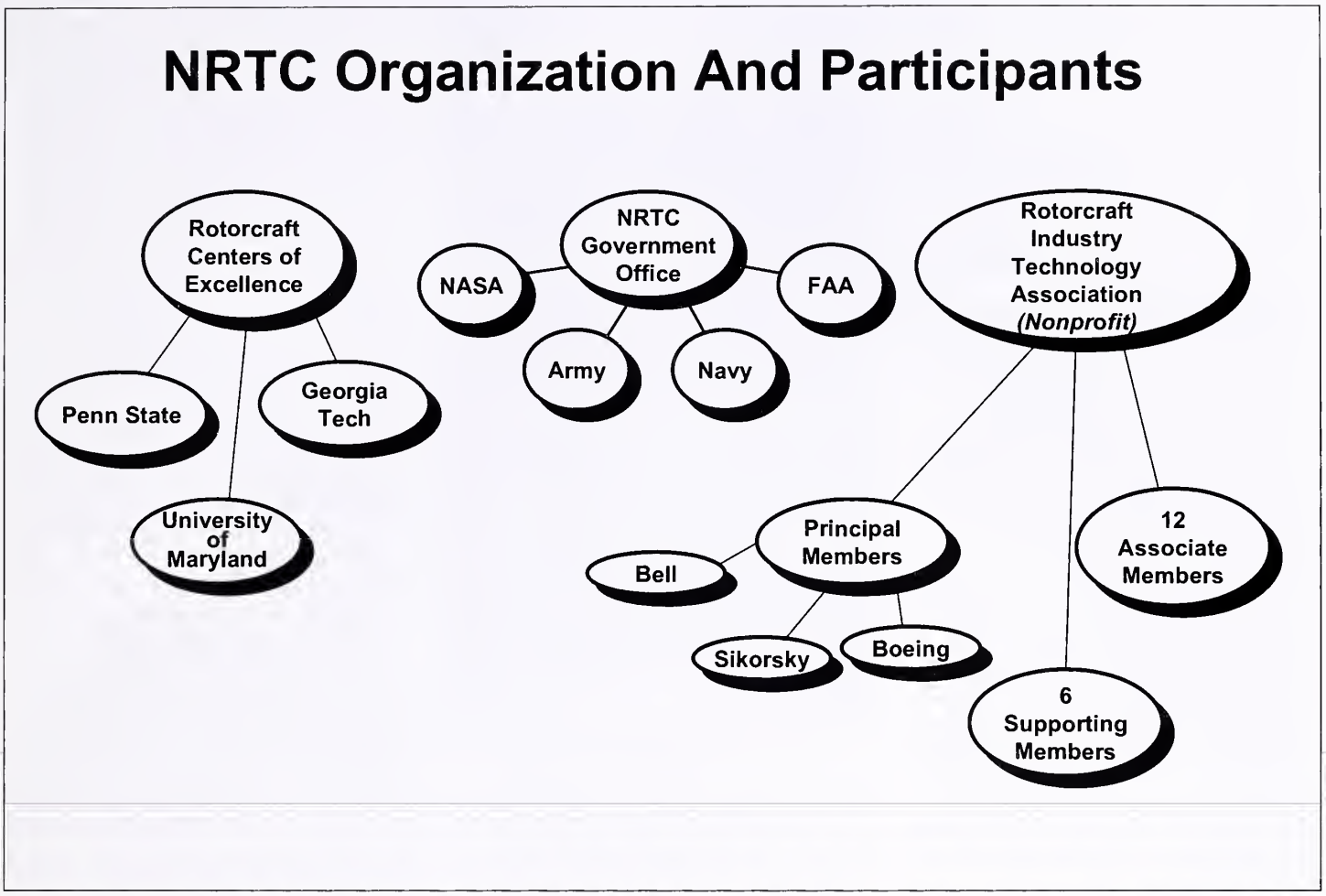
Introduction

As the Army enters into a new era of cooperation with NASA to support its goals in Simulation and Modeling for Acquisition, Requirements and Training (SMART), it is building on a 35-year Army/NASA tradition that has served as a model for interagency cooperation. In addition to the benefits of a highly integrated, joint workforce producing critical rotorcraft science and technology (S&T) products and providing customer support, the unique relationship and working arrangement has resulted in another innovative interagency endeavor to expedite near-term, dual-use rotorcraft technology. This new organization, the National Rotorcraft Technology Center (NRTC), expands the collaboration in an innovative partnership with the Navy, the Federal Aviation Administration (FAA), the rotorcraft industry, and academia.

Army/NASA Rotorcraft Collaboration

The Army aviation community has benefited for many years from a unique interagency agreement with NASA. With the buildup of U.S. forces in Vietnam in the early 1960s, air mobility became a key element in warfighting doctrine. Helicopters emerged as key players on the battlefield in a variety of Army roles. Concurrently, the Air Force had moved to consolidate its role in providing fixed-wing assets, leaving the principal development, fielding, and operations of rotorcraft to the Army. As such, the Army assumed responsibility for developing appropriate rotorcraft technology to meet its operational needs, as well as those of the other Services. The Army had an excellent capability in place to manage contracted research and development (R&D), but did not have the laboratories and national facilities to perform in-house research, support industry R&D, or develop the hands-on expertise required to fulfill its role as smart buyers of advanced rotorcraft.

During this period, NASA was transitioning from primarily focusing on aeronautics to addressing the challenges of space technology as well. There were facilities and expertise at NASA Ames Research Center, Moffett Field, CA, that could be leveraged by the Army, thus avoiding the need for duplicate facilities and capabilities. This situation precipitated a unique interagency agreement between NASA and the U.S. Army Materiel Command (AMC) for joint participation in low-speed aeronautical research. Under this joint agreement, the Army established a research organization at NASA Ames Research Center in 1965. This organization was provided direct access to NASA facilities and expertise in return for providing Army personnel to NASA support activities used by both agencies and



participating in joint rotorcraft research programs. Because of the success this agreement brought to both agencies, in 1969, an updated agreement between AMC and NASA was expanded to include similar organizations at NASA Langley Research Center, Hampton, VA, and Lewis (now Glenn) Research Center, Cleveland, OH.

Today, the NASA/Army joint agreement enables the U.S. Army Aviation and Missile Command Aeroflightdynamics Directorate to use facilities at Ames and Langley and the Army Research Laboratory Vehicle Technology Directorate to use facilities at Langley and Glenn. Since its inception, the joint agreement has been a model for interagency cooperation. It provides for a truly dual-use program, devoid of duplication of effort and trading on the strengths of each agency to achieve recognized world-class research products and expertise.

Expanding The Partnership

In the early 1990s, it became evident that U.S. military helicopter deliveries would decrease by 75 percent throughout the next decade. Since 1980, the world commercial rotorcraft market share held by U.S. industry dropped from 75 percent to less than 50 percent as a result of unified European competition. These market conditions degraded U.S. industry's ability to develop and insert advanced technology. Consequently, the continued supremacy of U.S. military and commercial rotorcraft technology was in jeopardy. In addition, both the Army and NASA were looking for new ways to partner with industry to provide a streamlined, focused approach to generate critical rotorcraft technology for both military and civilian applications. The NASA/Army joint agreement provided an ideal basis for dialogue between the two agencies to determine whether a new mutual approach to improve effectiveness of the investment of limited rotorcraft R&D resources could be developed.

This dialogue led to the creation of NRTC to develop critically needed rotorcraft technology for the U.S. rotorcraft industry. The FAA, through the existing *FAA-NASA Memorandum Of Understanding for Airworthiness Research*, and the Navy were added to the Army/NASA team to ensure that their rotorcraft programs and technology needs would benefit from the products of NRTC. The process by which this new partnership was formed is a case study itself. This article addresses the organization that resulted from that process and how it functions after 5 years of operation.

NRTC

The NRTC Government Office is located in existing NASA Ames Research Center facilities in Mountain View, CA, and includes a small interagency team of personnel from NASA, the Army, the Navy,

and FAA. The team cooperatively develops and implements a dual-use rotary-wing technology program that addresses both military and civilian rotorcraft needs. The effort is dedicated to establishing an aggressive and clearly focused approach to ensure continued superiority of DOD rotorcraft systems. At the same time, a dual-use benefit is provided that stengthens the U.S. rotorcraft industry's ability to compete in the civilian sector.

NRTC has been the catalyst for a paradigm shift to a new way of doing business between government and industry that emphasizes cooperation, streamlined processes, and minimum infrastructure. Through its primary program, NRTC adds an innovative approach that partners U.S. industry and academia through the Rotorcraft Industry Technology Association (RITA), a nonprofit corporation that is jointly managed and executed. Industry provides at least 50 percent of the funding for all projects. Government funding is provided through a Funded Cooperative Agreement established under the NASA Space Act. Technology needs are identified by customers and have a strong dual-use focus. Projects are defined by industry (RITA) in consultation with the government. A federated approach to sharing facilities and expertise is emphasized, and the NRTC Government Office facilitates access to government laboratories and capabilities. Research data and rights are shared among RITA members.

RITA has three membership levels (illustration on Page 13): the three major U.S. rotorcraft manufacturers are the principal members; industry component, test, and equipment suppliers may join as supporting members; and the academic community may join as associate members. Members in all categories pay dues to support a full-time RITA Executive Director and a small contracted administrative-support function. All members can participate in the research projects that are a part of the NRTC/RITA Program. Additional suppliers and universities can participate in the program as subcontractors to members, but unlike members, they do not participate in the cooperative formulation of the program.

NRTC also manages the Rotorcraft Centers of Excellence (RCOE) Program. Responsibility for this program, originally developed, managed, and funded by the Army Research Office, was reassigned to NRTC immediately after its formation. The NRTC partnership has resulted in the addition of substantial NASA funding to the RCOE Program, increasing the breadth of technology areas where the centers make major contributions. There are currently centers at the Georgia Institute of Technology, the University of Maryland, and Pennsylvania State University. The programs at these centers are reviewed annually by the same government/industry management team that oversees the NRTC/RITA Program. This ensures eliminating unnecessary duplication of effort and provides a ready path for transition of technology and talented students to industry and government labs. RCOE universities are all RITA associate members. Thus, this major university program in rotorcraft basic research directly benefits from its association with NRTC and RITA.

The National Rotorcraft Technology Center has been the catalyst for a paradigm shift to a new way of doing business between government and industry that emphasizes cooperation, streamlined processes, and minimum infrastructure.

Lessons Learned

When the NRTC Program was initiated in 1996, there were many people in government and industry who were skeptical that highly competitive companies like the U.S. rotorcraft manufacturers could work together effectively in a program of shared, pre-competitive technology development. As the program has developed, trust and confidence have been established, resulting in improved program formulation and quality and depth of S&T products. In the early years of the RITA Program, industry partners had to scramble to find good candidate projects to meet available funding levels. In formulating the proposed RITA Program for 2001, industry managers received almost twice as many good proposals as NRTC and RITA have resources to fund. Successes like the development of the Integrated Helicopter Design Tools Program, the development of health and usage monitoring system standards, and composite design and manufacturing technology demonstrations by multicompany teams have shown the value of collaboration to industry participants. Industry participants are now able to articulate their common technology needs and develop meaningful collaborative programs to attack technical challenges. Many industry teams also work closely with government researchers who contribute directly to the process rather than simply evaluate and monitor industry progress.

Summary

In the 5 years since its inception, NRTC has demonstrated a new way of managing a significant part of the national program for developing rotorcraft technology. The rotorcraft industry is enthusiastically providing half of the investment in these technology-development activities, sharing their research results with industry partners. The four government partners have signed a new 5-year Memorandum Of Agreement for program continuation, and a new 5-year Funded Cooperative Agreement with RITA is set to begin January 2001. The NRTC Program is an integral part of the plan for developing the technology required to produce a viable Future Transport Rotorcraft, as well as to sustain and improve the legacy fleet to meet Army aviation needs.

ANDREW W. KERR is Director of the U.S. Army Aviation and Missile Command Research, Development and Engineering Center Aeroflightdynamics Directorate and Director of the National Rotorcraft Technology Center—both located at Ames Research Center, Moffett Field, CA. He holds a B.S.E. in aeronautical engineering from Princeton University and an M.S. in aerospace engineering from the University of Southern California.

NASA SPACE TECHNOLOGY CAN IMPROVE SOLDIER PERFORMANCE

Dr. Patricia S. Cowings and
Dr. William B. Toscano

Introduction

One of the primary goals of NASA life sciences research is "... to enable a permanent human presence in space." To meet this goal, NASA is creating alternative protocols to evaluate and test countermeasures that will remedy the environmental effects of spaceflight on crewmembers' health, safety, and operational performance. NASA investigators have evaluated the effects of long-duration spaceflight on the physiology and performance of cosmonauts onboard the Mir space station. Specifically, investigators tested a countermeasure known as Autogenic-Feedback Training Exercise (AFTE), which is designed to prevent and/or correct adverse effects, i.e., facilitate adaptation to space and readaptation to Earth. AFTE is a 6-hour, physiological training program that has proven to be a highly efficient and effective method for enabling people to monitor and voluntarily control a range of their own physiological responses, thereby minimizing adverse reactions to environmental stress. However, because of limited opportunities to test this technology with spaceflight crews, investigators need operational or "real-world" environments to validate the efficacy of the approach.

AFTE's Relevance To The Army

Combat-vehicle crews operating land, sea, and air vehicles are expected to perform their missions with very little margin for error, even during extreme conditions of continuous operations over extended days or during high-stress situations. Environmental stressors experienced by aerospace crews and military personnel are both chronic (requiring sustained vigilance) and acute (requiring immediate actions). Exposure to these stressors can eventually lead to fatigue, physical and emotional exhaustion, or, in the case of an acute stress, a hyperreactive physiological state that may affect individual crewmembers and even entire units. In particular, motion sickness has been associated with deployment from amphibious vehicles, operations within enclosed tracked vehicles, and during tactical combat maneuvers in high-performance aircraft. Any combination of adverse conditions can degrade performance and cause fatalities because of human error. Crew operational readiness in extreme environments, whether on the battlefield or in space, is an important topic for both the military and NASA.

AFTE involves "exercising smooth muscles," where subjects are taught to both increase and decrease physiological response levels. Changes in response levels are achieved through alternating imagery of both relaxation and "emotional" stimuli. Each daily training session lasts 30 minutes during which subjects are taught to alternate increases and decreases in their response levels (e.g., heart rate, peripheral vasodilatation (dilation) and constriction, and increases and decreases in skin conductance). Changes in these specific responses are learned without the influence of respiration (hypo- or hyperventilation) or muscle contractions (measured at multiple sites). The purpose of this training is to provide subjects with the ability to recognize bodily sensations associated with changes in their physiological response levels and, with practice, to improve their skill in controlling them. Training incorporates components of operant conditioning, self-suggestions, systematic desensitization, progressive muscle relaxation, and verbal instruction. Additional training is required to deal with the complex array of information presented, i.e., the feedback for multiple parameters from both visual displays and auditory tones.

Laboratory Studies

Laboratory studies have demonstrated that subjects can use AFTE to control motion sickness symptoms in response to rotating chairs, vertical accelerators, and rotating visual surroundings. In addition, this type of training can be successfully used in other situations. In studies of more than 300 subjects, 65 percent of them completely suppressed symptoms and 85 percent significantly increased their tolerance. Furthermore, the gender of these individuals did not make a difference. For example, men and women learned at the same rate. Highly susceptible subjects also showed benefit. Although their training takes longer, the rate of learning is comparable. The effects of training are cumulative: the more individuals do it, the better they get. Learned autonomic control is retained for up to 3 years with rapid relearning.

Motion And Air Sickness

AFTE was also tested on astronauts and cosmonauts to counteract space motion sickness, and as a means of facilitating their physiological adaptation to space and readaptation after returning to Earth. Preliminary results indicate that the incidence of space motion sickness was reduced with AFTE, without the side effects of anti-motion sickness medication. Furthermore, when AFTE was practiced effectively during long-duration

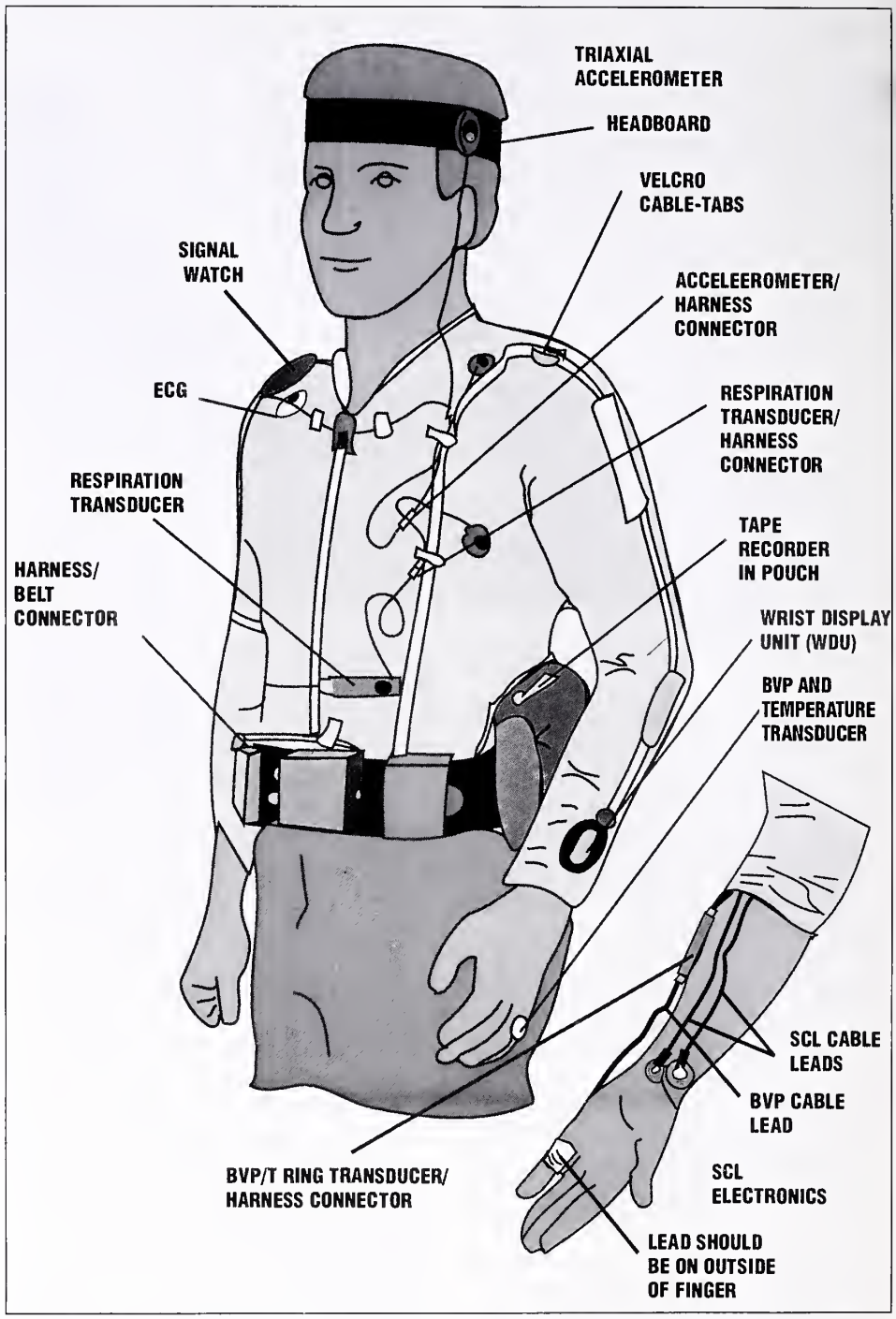
flights (6 months on Mir), little or no post-flight orthostatic intolerance (low blood pressure) resulted upon return to Earth.

In addition, AFTE has proven beneficial in treating intractable airsickness in military pilots who fly high-performance aircraft. Pilots, for whom all other treatments failed, were typically able to return to active flight status after AFTE training. Even when airsickness is not a primary problem, AFTE has been a useful adjunct to pilot training. Using AFTE, Coast Guard helicopter and C-130 pilots who flew high-stress, search-and-rescue missions improved their overall performance, as well as crew communication and coordination skills. Finally, in clinical studies with patients, AFTE provided substantial relief from symptoms of nausea, fainting, and severe abdominal pain.

Other Army-relevant AFTE applications may be tested in the future. These include improving performance during sustained operations; as a treatment for post-traumatic stress disorder; facilitating sleep under adverse environmental conditions; and eliminating simulator sickness. AFTE might also have application as a supplement to regular exercise to improve overall performance in students at military academies and in officer training programs.

AFTE Hardware

One of the hardware items used during the AFTE process is the Autogenic-Feedback System-2 (AFS-2) (figures on Pages 16 and 17). It is a portable ambulatory monitoring system worn on the subject's belt that monitors human physiological responses in space. AFS-2 has been used by space shuttle astronauts, Mir space station cosmonauts, military pilots flying high-performance aircraft, various patient populations as part of diagnostic evaluations, and soldiers during field operations in command-and-control vehicles. The system includes a garment, transducers, biomedical amplifiers, a wrist display unit (WDU), and a cassette tape recorder. The recorded physiological measurements include heart and respiration rates, blood flow and temperature, skin conductance level, and upper-body and head movements using a triaxial accelerometer. Ambulatory physiological data are recorded on analog cassette tapes and subsequently digitized and processed with customized software.



AFS-2 system components. SCL-skin conductance level; BVP-blood volume pulse; ECG-electrocardiography; BVP/T-blood volume pulse/transducer

The Autogenic Clinical Laboratory System (ACLS), a PC-based physiological monitoring and training system configured with four monitors (two for the researcher and two for the subject), is used during AFTE training. This system can acquire and digitally display 20 physiological parameters, as well as coupled audible tones. ACLS provides voice commands and respiratory pacing signals and can calculate and display derived variables such as cardiac output and stroke volume. The two monitors on the ACLS trainer's console display analog and numeric data. During training, the subject sits in a separate room containing two additional monitors. The trainer can select specific physiological parameters that are displayed to the subject and can choose any two parameters for providing

audible feedback tones. Training can be delivered over the Internet to PC systems at any location, thereby reducing time and costs of transporting personnel to a centralized training center.

Previous NASA/Army Research

In a recently completed study, AFS-2 was used to evaluate motion sickness incidents and performance of soldiers in an enclosed armored vehicle, the U.S. Army's Command and Control Vehicle (C2V). The C2V is equipped with four computers. By examining physiological responses, self-reports of symptoms, and a battery of performance subtests, Army researchers were able to decisively answer the following questions: "Who?" (how many soldiers were affected?), "How serious?" (what is the practical or operational impact?), and "When?" (under what environmental conditions did problems occur?). Results showed that when the vehicle was moving, motion sickness symptoms increased in all subjects. This was accompanied by degraded performance. Drowsiness and headache, not nausea, were the most pervasive symptoms occurring in 60-70 percent of the soldiers. Performance was degraded by at least 5 percent in 23 of the 24 soldiers. For 30 percent of these subjects, the performance degradation was operationally equivalent to having a blood alcohol level above 0.80, the legal limit in most states. Furthermore, these negative effects were not mitigated by intermittent, short halts or by seat orientation. Researchers concluded that a majority of soldiers were less likely to accomplish mission objectives that involved mobile operations in the C2V.

Multiple converging indicators (i.e., measurements of cognitive and psychomotor skills, symptoms, and physiology) provide more definitive information about the environmental impact on the human functional state than any single indicator. The methodology employed in the C2V study and onboard the Mir space station may also be useful for examining the environmental impact on soldiers in other land, sea, and air vehicles.

Soldier wearing the AFS-2

AFTE Comparison

Consider the potential benefits of AFTE compared to other countermeasures. Much has been published in recent years on the benefits of allowing pilots to take brief naps to counter the debilitating effects of cumulative sleep loss. However, naps are not feasible in many military and commercial situations, as well as during long-duration spaceflights. A crewmember may be *compelled* to continue work despite heavy workloads under life-threatening conditions, a lack of sleep, or when facing the potential loss of significant mission objectives. Unlike pharmacological agents like stimulants, tranquilizers, or anti-motion sickness medications that produce deleterious side effects, AFTE has no side effects. Extended use of medications may also be contraindicated because they can present a potential health hazard to crewmembers. AFTE may offer one option for mitigating negative environmental effects on soldiers and astronauts when the use of medication is untenable and when modification of the vehicle, crew tasks, or sleep schedules is unfeasible.

Conclusions

AFTE has the potential to provide a single-intervention approach for solving multiple problems. AFTE's goal is to train individuals to recognize early physiological changes associated with stressful situations and thereby increase situational awareness. AFTE is not a relaxation training method, but rather a means of gaining a quantifiable skill (where skill level can be tracked over time). Operational field tests of AFTE are required for validation prior to use as a countermeasure in space, and collaborations are actively sought. Hopefully, both NASA and the U.S. Army will benefit from collaborative testing of protocols such as AFTE that mitigate the adverse effects of environment.

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DR. WILLIAM B. TOSCANO is on the staff of the Department of Psychiatry at the University of California, Los Angeles and has served as a Co-Investigator with Cowings on flight- and ground-based research projects.

A HISTORY OF REDSTONE ARSENAL

Dr. Kaylene Hughes

Introduction

For more than 50 years, different organizations in the vanguard of the Army's missilery and rocketry programs have been headquartered at Redstone Arsenal, AL. For almost 40 years, Redstone has also been the site of the only NASA spaceflight center located on an Army installation. During these decades, both the Army and NASA have made many significant contributions to the Nation's high-tech Defense and space programs.

World War II Origins

Today's arsenal is the combination of two adjoining installations, Redstone Arsenal and Huntsville Arsenal, built in 1941 to manufacture conventional and chemical munitions during World War II. Once the war ended, production at both installations ceased. Postwar "mothballing" activities occupied severely reduced staffs at both facilities for another 16 months. Redstone Arsenal was put on standby status in February 1947, while Huntsville Arsenal was declared excess to the needs of the Army in September. After the Air Force declined use of Huntsville Arsenal in November 1948, the Secretary of the Army directed that it be advertised for sale by July 1, 1949. This sale never happened, however, because the Army needed this installation for the new rocket and missile mission developing at Redstone.

Rocketry, Missilery, And Space

Redstone Arsenal, 1950-1956. After an extensive survey of all Army ordnance installations, the Chief of Ordnance designated Redstone Arsenal in October 1948 as the Army's center for research and development (R&D) of rockets and related items. He officially reactivated the arsenal as the site of the Ordnance Rocket Center on June 1, 1949. To further increase the economy and efficiency of the Army's rocket and missile programs, the Secretary of the Army approved the transfer of the Ordnance Research and Development Sub-Office (Rocket) from Fort Bliss, TX, to Redstone Arsenal. Among those transferred were Dr. Wernher von Braun and his team of German scientists and engineers, who came to the United States after the war as part of Operation Paperclip. Huntsville Arsenal, which had ceased to exist as a separate installation on June 30, 1949, was officially consolidated with Redstone Arsenal on April 1, 1950, to accommodate the newly transferred missions and personnel.

The transferred suboffice was renamed the Ordnance Guided Missile Center once the "Fort Bliss group" relocated to Alabama. In its 8 years as the commodity arsenal for rockets and guided missiles, Redstone Arsenal served as the nerve center not only for R&D but also for the procurement, storage, maintenance, and repair of the entire family of Army ordnance missile systems. The installation was also approved in February 1951 as the location for conducting guided missile courses.

Army Ballistic Missile Agency (ABMA), 1956-1961. This agency was established at

Redstone Arsenal Headquarters, 1942-1961

Redstone Arsenal on Feb. 1, 1956, because of the availability of necessary resources at the installation and the proven success of the Redstone missile program. With the new organization's activation, however, Redstone Arsenal suffered a severe loss in mission, personnel, and facilities because the core of ABMA came from the Guided Missile Development Division of Redstone's Ordnance Missile Laboratories. ABMA was established for a purely military mission: to field the Army's first intermediate range ballistic missile (IRBM). In addition to responsibility for the Redstone and Jupiter IRBM programs, the Army assigned the Pershing missile project to ABMA in 1958.

The Army satellite program, for which the agency was best known, was executed under special orders and was not actually assigned as one of the organization's missions. During the 30 months stretching from the successful launch of Explorer I (Jan. 31, 1958) to the formal transfer ceremony that officially opened the George C. Marshall Space Flight Center at Redstone (July 1, 1960), ABMA accomplished several other significant missions. The agency placed four Earth satellites into orbit as well as launched the "Free World's" first lunar probe and first solar satellite. It also sent three primates into space, two of which (Able and Baker) were recovered alive. In addition, ABMA initiated effort on a 1.5-million pound thrust booster being designed for a lunar exploration launch vehicle (Saturn), and it began work on the launch vehicle (Mercury-Redstone) that would carry the first Americans into space.

The Army Ordnance Missile Command (AOMC), 1958-1962. The increasing importance of missilery and the pressing need for exploiting resources to their maximum capability led the Army to create AOMC on March 31, 1958. The new command was the largest field organization within any of the Army's technical services in the number of personnel, value of facilities, number of assigned weapon systems programs, and allotted dollars.

The subordinate elements of AOMC included ABMA, the Jet Propulsion Laboratory at the California Institute of Technology, and White Sands Proving Ground (later White Sands Missile Range), NM. Another subordinate element of AOMC was the Army Rocket and Guided Missile Agency (ARGMA), officially established June 1, 1958. The new organization assumed the technical missions formerly assigned to Redstone Arsenal. The former commodity arsenal's primary function was reduced to providing support and housekeeping services to AOMC. After it was replaced as AOMC's support element June 1, 1961, by the Army Ordnance Missile Support Agency, Redstone Arsenal became a geographical location only.

Marshall Space Flight Center Headquarters

The NASA Transfer. Early in 1958, President Dwight D. Eisenhower's Science Advisory Committee and the Advisory Committee on Governmental Organization recommended that a civilian agency be established to direct nonmilitary space activities. On July 29, 1958, the president signed the National Aeronautics and Space Act, creating NASA and making it responsible for conducting scientific exploration of outer space for peaceful purposes. The new organization was activated Oct. 1, 1958. A cooperative agreement between NASA and the Army was signed Dec. 3, 1958. The agreement continued to cover AOMC's work for NASA after Oct. 21, 1959, when Eisenhower approved the transfer of ABMA scientists and engineers to NASA. The Development Operations Division of ABMA, the nucleus of which was the von Braun team, remained an Army responsibility until it was shifted to NASA after Congressional approval.

The NASA Administrator, the Secretary of the Army, and the Acting Secretary of Defense signed the Army-NASA Transfer Plan Dec. 16-17, 1959. Congress approved the plan March 15, 1960. It provided for ABMA's continued performance of military weapon systems missions and permitted NASA to establish a substantially independent space vehicle R&D organization at Redstone Arsenal. On July 1, 1960, AOMC formally lost all of its space-related missions, along with about 4,000 civilian employees and $100 million worth of facilities and equipment at Redstone Arsenal and Cape Canaveral, FL. These resources became part of the Marshall Space Flight Center, which officially opened that same day.

AOMC Reorganization. On Dec. 11, 1961, both ABMA and ARGMA were abolished, and their functions and personnel

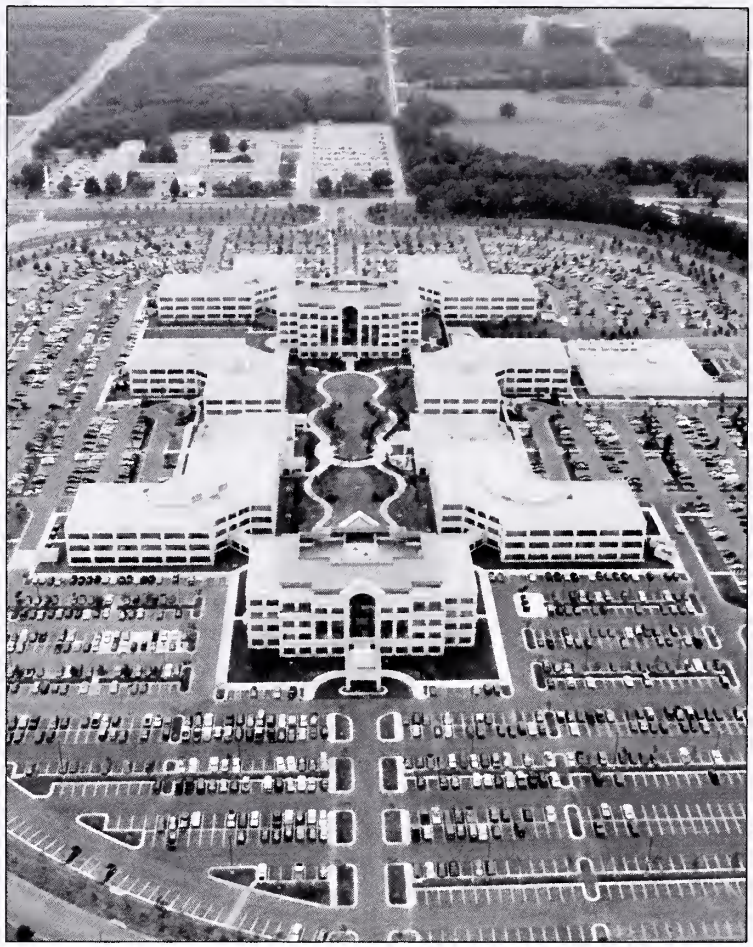
were merged with AOMC Headquarters. Knowledge of the pending Armywide reorganization heavily influenced the consolidation and restructuring of the command. On Jan. 1, 1962, White Sands Missile Range was removed from AOMC's jurisdiction and placed directly under the Chief of Ordnance. These actions subsequently helped to smooth the transition from AOMC to the new command established at Redstone Arsenal as part of the Armywide reorganization of 1962.

Army Missile Command (MICOM), 1962-1997. The Army established MICOM on May 23, 1962. It activated the command under the jurisdiction of the U.S. Army Materiel Command (AMC) on Aug. 1, 1962, at which time AOMC officially ceased to exist. The Missile Command was incorporated with nearly 20 major missile systems under project and commodity (product) management.

On Jan. 31, 1977, MICOM was abolished. Its missions and personnel were divided between the Army Missile Materiel Readiness Command (MIRCOM), which was oriented toward missile readiness, and the Army Missile Research and Development Command (MIRADCOM), which was dedicated to missile R&D, acquisition, and initial procurement. This divided command structure lasted until April 25, 1979, when the Army approved the merger of MIRCOM and MIRADCOM into a single organization to reduce duplication, improve efficiency, eliminate interface and transition problems, and better use dwindling resources.

Another significant organizational and mission change occurred at Redstone Arsenal on May 1, 1987, with the provisional establishment of four program executive offices (PEOs). These new organizations were key to the Army's restructured acquisition process.

Army Aviation and Missile Command (AMCOM), 1997-present. On June 23, 1995, the Base Realignment and Closure Commission decided to move 2,569 federal jobs to Redstone Arsenal and combine the Army's aviation and missile functions as a single new command. The Army Aviation and Troop Command (ATCOM) was officially deactivated in St. Louis, MO, on June 26, 1997. The Army provisionally established AMCOM July 17, 1997, by merging MICOM and ATCOM. The new command, which became permanent Oct. 1, 1997, encompasses the aviation and missile missions of the former ATCOM and MICOM organizations.



Headquarters, U.S. Army AMCOM

AMCOM still participates in cooperative efforts with the Marshall Space Flight Center, including a virtual-reality laboratory opened in 1997; a microelectronics lab that is developing techniques for optical switching; and development of low-cost avionics for NASA experimental vehicles.

Conclusion

Redstone Arsenal currently has a workforce of nearly 20,000 government and contractor employees. It is home not only to AMCOM and the PEOs for Tactical Missiles and Aviation, but to the Missile and Space Intelligence Center of the Defense Intelligence Agency; the Army's Test, Measurement and Diagnostic Equipment Activity; the Logistics Support Agency; Technical Test Center; the Ordnance Missile and Munitions Center and School; and elements of the Defense Property Disposal Service. Although not located on post, the PEO for Air and Missile Defense, the U.S. Army Space and Missile Defense Command, the NATO Medium Extended Air Defense System Management Agency, and the U.S. Army Engineering and Support Center, Huntsville, additionally all receive support and service from Redstone Arsenal.

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THE NASA INTELLIGENT SYSTEMS PROGRAM

Dr. Robert J. Hansen, Dr. Daniel Cooke,
Dr. Kenneth Ford, and Dr. Steven F. Zornetzer

Introduction

At the 2000 Army SMART (Simulation and Modeling for Aquisition, Requirements and Training) Conference this past January, an agreement was signed by the Army and NASA to collaborate on a wide range of modeling and simulation (M&S) efforts. NASA described two new programs potentially relevant to this collaboration: the Intelligent Synthesis Environment Program and the Intelligent Systems Program. This article summarizes the latter of these initiatives.

In 1996, NASA initiated an extensive strategic planning process for computer science and information technology (IT) research and development (R&D). This process involved finding the answers to two questions. First, what are NASA's most important future missions and functions for which IT research is the critical enabler? Second, how should NASA invest its computer science and IT R&D dollars in the early part of the new millennium?

We determined that the most critical challenges faced by NASA and its customers for which advanced IT is the critical enabler are spacecraft autonomy, next-generation design of complex systems, aviation operations, Earth science data interpretation, and human exploration of Mars and beyond. Detailed analyses of what was needed to address these challenges suggested that NASA place special emphasis on the following: automated reasoning in support of autonomy and intelligent data understanding; human-centered computing, a relatively new interdisciplinary field associated with performance enhancement of individuals and teams through application of emerging computer science concepts; and high-performance computing and networking. This ultimately led to establishment of the Intelligent Systems Program, which focused on fundamental improvements in the four components of automated reasoning, human-centered computing, intelligent data understanding, and revolutionary computing concepts. The objective is to provide improved software and hardware technologies for performing the next generation of space missions, air traffic management, and for use in complex system design. The four components of the Intelligent Systems Program are described in more detail in the following paragraphs.

Automated Reasoning

Given the distances from Earth that spacecraft will travel in the future, with or without humans onboard, most forms of direct control from Earth are not feasible. Electronic communications traveling at the speed of light would require 10-minute one-way trips to and from Mars. The response to events requiring ground control assistance will require a minimum 20-minute delay before resolution. Because of the critical requirement that events be handled quickly and effectively, NASA is facing the reality that it must increasingly depend on the autonomous operation of spacecraft for deep-space exploration. These craft must perform guidance and control commands, real-time system reconfiguration in response to unanticipated subsystem failures, and onboard interpretation of the scientific significance of data being collected, all with little or no human intervention. This is in marked contrast to current mission operations, where detailed guidance and control commands are provided by mission control on Earth, all data is transmitted to Earth for post-analysis, and no real-time system reconfiguration capability exists.

An important initial step toward autonomy was realized in June 1999 when, for the first time, NASA put a spacecraft under the control of an onboard, automated reasoning capability called remote agent. This model-based reasoning methodology successfully demonstrated the capability to perform system reconfiguration in response to simulated system faults.

The automated reasoning element of the Intelligent Systems Program will build on recent successes by extending the capability of model-based reasoning paradigms, development of other automated reasoning methodologies, and development of a means of automated generation and testing of automated reasoning software.

The critical path in deploying spacecraft and in meeting NASA's science objectives in space and on Earth centers around the time it takes to develop high-assurance, safety-critical software. The automated reasoning component will focus on developing formal approaches to the automatic generation of provably correct software to streamline the development of software in these domains. Furthermore, efforts to enhance and improve the ability to validate and verify safety-critical software will be undertaken.

Human-Centered Computing

NASA is working with the Federal Aviation Administration to develop methods to improve both the safety and capability of the Nation's air traffic system. The goal is to enable geographically distributed teams of experts (pilots and air traffic controllers) and the supporting information systems to perform in an optimal manner. A similar challenge is presented by the emerging reality of complex system design in which teams of experts and supporting data are distributed around the globe. There is a critical challenge to take a "system" view that is distinguished from current views of design. In both domains, formal approaches are needed that provide a more holistic view, including the cognitive and perceptual abilities of humans, computational assets, and other intelligent agents and knowledge sources.

intelligent agents and knowledge sources. The two domains are also alike in that initiative is exercised by human experts using the supporting information systems. Understanding and improving the performance of such "mixed-initiative" systems is a primary objective of the human-centered computing element of the Intelligent Systems Program.

Human-centered computing has the potential to understand and enhance individual and team performance, and the Intelligent Systems Program will focus on this latter element as well. The goal is to develop revolutionary approaches to formal design that result in systems where collections of machines achieve their optimal level of reasoning. An additional goal is to develop knowledge-based capabilities to interact more effectively with humans to allow them to perform the higher level cognitive tasks involved in discovery and invention. Ultimately, space exploration is envisioned as an effort involving societies of machines and humans, all performing at more optimal levels.

Intelligent Data Understanding

NASA's present and future missions place a premium on the intelligent use of very large data sets. For example, satellites have recently been deployed for Earth science measurements (e.g., Landsat 7 and Terra). When all elements of the Earth Observing System are fully deployed, they will generate more data per month than currently reside in all NASA databases on all topics. Another example is the Stratospheric Observatory for Infrared Astronomy. This observatory will be deployed onboard a Boeing 747 in approximately 2 years to collect large data sets during subsequent decades. A third example is provided by the large databases containing maintenance files on such critical and complex systems as the space shuttle. In all of these cases, there is a premium on the development of methodologies to establish cause-effect relationships among the variables represented in the data. Current data-understanding methodologies assist in identifying correlations among variables, but are inadequate for identifying causal relationships for the most complex scientific investigations and most challenging maintenance problems.

Central to NASA's need for intelligent data understanding are processing and analysis requirements that result from NASA's unique opportunities for data acquisition through remote sensing. Although the general attributes and intended uses of sensed objects are understood, the purposes for which the resulting data may be used and the problems the data may help solve could indeed serve as significant questions to motivate scientific investigations.

The current situation can be viewed as one where large numbers of observations have been acquired and stored on distributed databases, resulting in the need for theories that distill the information and knowledge content contained therein and between databases. Because the acquisition of data is a continuing process, general tools to assist humans in generating and testing these theories are needed. Vast amounts of data are involved, therefore, automated approaches that limit the need for human assistance are desirable.

Revolutionary Computing

Within NASA, three complementary approaches to high-performance computing are being pursued in parallel. First, working with industry partners, NASA is developing progressively larger single-system image machines based on commodity processors. This architecture holds the promise of performing very large calculations, traditionally done on vector architectures, with only minor modifications to legacy code written for the vector architectures. Second, in partnership with the National Science Foundation, NASA is performing the computer science research and demonstrations required to realize distributed, heterogeneous computing. It is anticipated that future computations will require more capability than resides at any single site, necessitating the use of geographically distributed assets (computers, databases, etc.) connected over high-speed networks. Third, as part of the Intelligent Systems Program, research on new approaches to computing is being studied. For example, quantum computing is a focus of attention as a computing paradigm that may be particularly powerful for the type of search problems that are associated with spacecraft autonomy. An important focus of this component will be on the models of computation and computer languages that may be implied by quantum and DNA (deoxyribonucleic acid) approaches to computing. It is hoped that the computational models developed might lead to the discovery of technically feasible solutions (even those that involve conventional architectures) to problems currently considered to be intractable.

Conclusion

Effective M&S for Army applications may require a range of capabilities being developed by NASA as a part of the Intelligent Systems Program. These include concepts for collaboration of geographically distributed teams that may be developed in the human-centered computing context, new methods of generating and testing software that may emerge from automated reasoning research, and methods of using very large quantities of data to develop a new level of understanding of important relationships contained therein. These possibilities and others will be explored with the Army SMART initiative on an ongoing basis.

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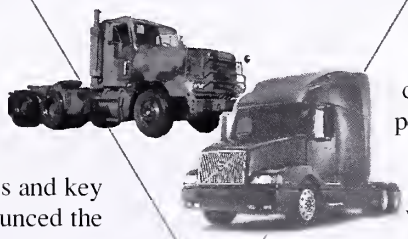
21st Century Truck Initiative

Partnering To Improve The Nation's Truck Fleet . . .



Paul F. Skalny

Introduction

On April 21, 2000, Vice President Gore, flanked by senior government officials and key industry partners, announced the formation of the 21st Century Truck Initiative. This initiative represents an extraordinary partnership between the U.S. Departments of Defense (DOD), Army (DA), Energy (DOE), and Transportation (DOT); the Environmental Protection Agency (EPA); and the U.S. trucking industry. The purpose is to develop, demonstrate, and integrate commercially viable advanced technologies for the Nation's military and commercial truck fleets in the 21st century. The National Automotive Center (NAC), located within the U.S. Army Tank-automotive and Armaments Command's Tank Automotive Research, Development and Engineering Center (TACOM-TARDEC) fostered this initiative at the request of senior DOD and DA leadership. The initiative's mission is to improve fuel efficiency, increase safety, reduce ownership and operating costs, reduce emissions, and enhance the performance of military and commercial trucks.

Need For Efficient Trucks

To remain in a position of economic and military superiority, the Nation must continue to improve the efficiency of all processes, including transportation services. With the advent of the 21st century, the Nation faces huge challenges in the areas of energy consumption, safety, affordability, performance, and environmental protection. The development of better performing, more fuel-efficient, safer, more affordable, and cleaner vehicles is a formidable yet necessary goal for military and commercial truck fleet owners and operators.

Trucks are the critical lifeline for the movement of supplies and equipment, and their importance cannot be overstated. Army trucks are key to providing logistical support to those involved in any military operation. Fuel is by far the greatest logistical challenge, comprising 70 percent of the bulk tonnage shipped in support of military deployments. Trucks also represent a critical link in the Nation's economy and are, therefore, a vital national resource. Nearly 85 percent of the U.S. commercial freight by dollar value is transported via truck, and data collected over the past 35 years indicate a direct correlation between the Nation's economic performance and the efficiency of the trucking industry. In short, the requirement for rapid and economic transportation of supplies remains critical for both the military and the Nation.

The Partnership's Leading Elements

Within the government, the Army is the largest owner of medium and heavy trucks (more than 250,000 vehicles). In addition, the Army is one of the largest owners of these vehicles in the United States. The Army spends approximately $2 billion per year (fuel costs account for more than 20 percent) operating and maintaining its truck fleet. Early on, DOD and DA realized that a national partnering initiative for trucks, focusing on increased fuel efficiency, safety, and affordability of medium and heavy trucks, would greatly benefit both the military and the private sector. Tasked by the Army, the NAC developed a 21st Century Truck Initiative Plan that was approved by Paul J. Hoeper, Assistant Secretary of the Army for Acquisition, Logistics and Technology, in September 1998. The plan served as the catalyst for the national initiative. The NAC, established in 1992, is DOD's and the Army's focal point for partnering with industry to share costs in the development and demonstration of automotive and truck technologies. It is, therefore, the logical choice to establish and play a central role in managing a partnership between the trucking industry and the government.

Both the Army and the Nation will benefit. As the Army transforms into a lighter, more mobile, more fuel-efficient force, the rapid integration of advanced commercially viable technologies into military trucks (weighing more than 8,500 pounds gross vehicle weight (GVW)) is mandatory (Figure 1 on Page 24). Advancements in technologies such as hybrid-electric propulsion are an eagerly awaited result of the 21st Century Truck Initiative. Advancements such as these are the foundation to improve combat effectiveness through enhancements in acceleration and stealth capability and reductions in fuel usage and stand-alone power-generation equipment. As efforts progress under the 21st Century Truck Initiative, research and development (R&D) will result in the integration of commercially viable advanced technologies into commercial trucks and buses as

well (Figure 2 on Page 25). Furthermore, integration of more common components between government and military fleets will result in reduced logistical burdens and economies of scale.

DOD, DA, DOE, DOT, and the EPA will build on existing R&D investments. Through cooperative efforts, industry is expected to rapidly and continuously transition these R&D achievements (i.e., commercially viable technologies) into production vehicles.

10-Year Research Objectives

The 21st Century Truck Initiative is geared to achieving the following 10-year research objectives:

- Improve fuel efficiency of heavy-duty trucks and buses. Significantly improve miles-per-gallon usage by the year 2010.
- Reduce emissions. Exceed standards for oxides of nitrogen, particulate matter, carbon monoxide, and hydrocarbons by the year 2010.
- Enhance safety. Meet or exceed the motor carrier safety goal of reducing fatalities by half in 10 years.
- Improve the crash friendliness of trucks for other road users.
- Conduct operation road tests of truck safety improvement components.
- Enhance affordability.
- Maintain or enhance performance.

Government and industry will coordinate R&D efforts and equally share costs for this 10-year initiative. Federal agencies are likely to cover a larger

Class 8 M915 Line Haul Rig
430 hp Diesel; 105,000 lbs GVW

Class 6 FMTV Tactical Truck
225 hp Diesel; 26,000 lbs GVW

Class 2B HMMWV M998 Utility Vehicle
190 hp Diesel; 10,000 lbs GVW

Figure 1.
Representative military trucks

Class 6 Enclosed Delivery Truck
(Ford F-650)
190 hp Diesel; 26,000 lbs GVW

Class 8 Line Haul Rig
(Kenworth T-2000)
430 hp Diesel; 80,000 lbs GVW

Class 8 Transit Bus
(Nova RTS)
275 hp Diesel; 40,000 lbs GVW

Class 2B Utility Truck
(Ford F-350)
235 hp Diesel; 10,000 lbs GVW

Figure 2.
Representative commercial vehicles

portion of research expenses for work involving long-term, high-risk research, while industry funding will be greater for research likely to be converted relatively quickly to commercial products. The president's budget for FY01 includes $142 million for truck research and related fact-finding, an increase of $46 million from FY00. It is anticipated that the initiative will expand the current annual federal budget for truck research from $96 million to approximately $250 million.

Technology

Equal investments from industry and government will address the full range of research areas associated with the trucking industry and its suppliers. These research areas are as follows:

- Advanced propulsion technology, with a focus on advanced diesel-engine, hybrid-electric, fuel-cell, and advanced drivetrain technologies;
- Alternate fuels that are adaptable to the full range of propulsion sources, with a focus on clean burning;
- Advanced materials like high-strength steels, aluminum, magnesium, and composites, with a focus on their optimized use;
- Vehicle intelligence, with a focus on advanced-communication and early warning technologies, vehicle diagnostics, and prognostics;
- Advancements in vehicle designs to reduce aerodynamic drag, with a focus also on reducing other forms of parasitic losses like rolling resistance;
- Safety, with a focus on the driver environment, driver hardware and

The 21st Century Truck Initiative is the culmination of efforts by government and industry to greatly benefit both the Nation's military and civilian communities and to increase the Nation's overall economic welfare.

hardware-environment areas (i.e., vision enhancement, lane change and merge assistance, roadway departure warning, vehicle operation monitoring, rear-impact warning, and advanced brake materials); and

• Emission reduction, to include exhaust gas recirculation, selective catalytic reduction, particulate matter catalytic soot filters, oxidation catalyst, NOx adsorber/catalyst, homogeneous charge compression ignition combustion, and fuel cell/hybrid powertrains. (Many of these options also require the use of ultra-low sulfur fuel.)

Lead Management

A Partnership Coordinating Committee has been formed and is responsible for coordinating the execution of the initiative. The committee includes senior representatives from industry, DOD, DA, DOE, DOT, EPA, the Office of Science and Technology Policy, the Council on Environmental Quality, the National Partnership for Reinventing Government, and the Office of Management and Budget.

With the assistance of the academic community, the Partnership Coordinating Committee will direct the development of both the initiative's overall research plan and associated technology roadmaps. The research plan and technology roadmaps are required to determine the appropriate level of investment in advanced technologies to meet the initiative's aggressive research objectives. Successful technology roadmapping is dependent on an awareness of current research and technology programs, an understanding of the limitations of current research and technology, the technical barriers that need to be overcome, and a vision of potential future technologies. Technology roadmaps will be continuously refined and will detail timetables for the 10-year span of the initiative. Throughout the duration of the initiative, close coordination will be maintained with the various managers of military trucks to ensure the rapid and cost-effective integration of advanced technologies into military trucks on an ongoing basis.

The Partnership Coordinating Committee will also coordinate and support the R&D teams organized around specific research objectives to achieve the program's goals (such as technologies for improving powertrains, reducing aerodynamic and rolling resistance losses, and reducing vehicle weight). Each team will include government and industry partners and representatives from the academic community.

The Partnership Coordinating Committee will also create an overall Cooperative Research and Development Agreement (CRADA) for the partnership. The committee will develop guidelines that will facilitate the development and use of CRADAs and other procurement mechanisms such as other transaction agreements involving individual federal agencies and their laboratories.

Finally, an external advisory board, consisting of individuals with appropriate expertise from industry, academia, state and local governments, and public interest groups, will be established to develop a peer review to assess technical and program progress.

Conclusion

The 21st Century Truck Initiative is the culmination of efforts by government and industry to greatly benefit both the Nation's military and civilian communities and to increase the Nation's overall economic welfare. It will help the Nation do more using fewer resources. This initiative represents a key milestone for the Army and DOD in the quest to develop and demonstrate advanced technologies that can be integrated into commercial and military trucks and buses. It will immensely assist the military in achieving a lighter and more fuel-efficient mobile force.

Integration of 21st Century Truck Initiative technologies provides an excellent mechanism through which the Army can increase the capability and reduce the cost of future systems. Reducing the fuel and operating costs of the force can potentially save the Army billions of dollars. The NAC, as DOD's and the Army's focal point for partnering with industry, is proud of its role in leading the 21st Century Truck Initiative.

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Editor's Note: This is the first of a two-part article that discusses whether establishing a military occupational specialty (MOS) for noncommissioned officers (NCOs) within the Army contracting structure will benefit the Army and its enlisted contracting personnel. The article focuses on how best to integrate enlisted personnel within the current structure of contingency contracting and analyzes the effectiveness of NCOs in helping contracting commands prepare for future deployments.

The second part of this article will appear in the next issue of Army AL&T and will discuss benefits and associated problems involved in establishing a contracting MOS.

DOES THE ARMY NEED A CONTINGENCY CONTRACTING MOS FOR NCOs?

MAJ Mel M. Metts and MAJ Nick Castrinos

Introduction

Before the establishment of the Army Acquisition Corps (AAC), contracting officers first served in their primary branch until they were branch qualified at the captain level, then served a tour in their functional area. While serving in the contracting functional area, officers were required to remain competitive for promotion within their primary career field or basic branch. Serving a tour in the contracting functional area decreased an officer's opportunity to obtain branch-qualifying jobs at the major level and still remain competitive for promotion. Contracting officers had to rotate between their contracting functional area and their primary basic branch, although they were developing skills better suited to their functional area. As a result, officers were not highly proficient in either their primary branch or the contracting field. Army leaders recognized there was a learning curve and a perishable-skills issue at stake by requiring officers to maintain proficiency in both their primary and functional areas.

To varying degrees, the issues involved in employing a contracting NCO are the same as those that existed for officers before the creation of separate career paths: the tour in the contracting field is only a temporary assignment. The question then arises: Is the Army headed for similar trouble with NCO contracting personnel that it experienced with officers? We think the answer is yes!

Other Services

In the U.S. Marine Corps (USMC), enlisted personnel are accessed into the contracting field at the sergeant level and can remain in a contracting MOS throughout their careers. The primary candidates for accession into the contracting field come from the supply administration field; however, some are accessed from other MOSs. Before accession into the contracting field, the NCO is required to successfully complete 6 months of mandatory on-the-job training. This provides the basic skills and technical expertise required to become a contracting NCO.

In the U.S. Air Force (USAF), enlisted personnel in contracting are accessed at the airman level. Personnel begin their contracting careers when they enter the Service. This is not to say the USAF does not access enlisted personnel at other grades, however, the USAF considers accession at the earliest opportunity in the career development process vital to developing the future Acquisition Workforce.

The USAF accesses NCOs from all other MOSs at the senior airman to master sergeant grades. Using two sources of accession provides the USAF with a mixture of airmen promoted within the system and personnel with prior field MOS experience in contracting. The USAF has a well-defined and long-established career MOS for enlisted contracting personnel.

Current Issues

Perceptions. The majority of NCOs entering the contracting field are senior-level NCOs. This gives the perception that senior NCOs entering the contracting field are less competitive for promotion in their primary branch and are therefore attempting to acquire a marketable job skill to be used upon retirement. Additionally, by allowing senior NCOs to enter the contracting field after their 15th year of service, the Army may not receive a good return on its investment.

Training Levels. The majority of NCOs are Level I qualified, and those NCOs who are Level II certified are primarily senior NCOs (sergeant first class). Typically, the senior NCOs are on their second job rotation as contracting NCOs. Senior NCOs enter the contracting field as a sergeant or staff sergeant, serve a tour as a procurement NCO, return to their primary MOS for an assignment, and then return to the contracting field. This suggests only a remote possibility of obtaining Level II certification during the first job rotation, and repetitive tours are necessary to attain higher certification levels.

Contracting Skills Are Highly Perishable. Because of the continuously changing environment, if contracting skills are not constantly updated, an individual risks losing expertise. Contracting officers and NCOs must keep abreast of the latest changes in administrative and procurement regulations and policies.

Part-Time NCOs. Presently, NCOs with the contracting Additional Skill Identifier (ASI) G1 (contracting agent) are being trained for their current tour only, not for long-term usability in the contracting field. Again, contracting is technical and requires more than formal classes; hands-on skills are necessary to achieve proficiency. When NCOs return to their primary branch, these skills are not lost but temporarily forgotten.

Contracting Command Concerns. Under the current NCO structure, contracting commands lose continuity and stability. When a new NCO arrives, or an experienced NCO begins a second tour, the training process starts again. Achieving the qualifications of an ASI G1 (contracting agent) takes a minimum of 2 years, including mandatory classes (CON 101, CON 102, and CON 234) and on-the-job training. This time does not include any mandatory deployments, which are never ending.

Cost-Benefit Ratio. The current cost to obtain an ASI G1 is approximately $30,000. The cost-benefit ratio the Army receives after training is only 33 percent if the NCO is qualified in 2 years and is employed for 1 year. Remember, NCOs leave after a 3-year tour, and there is no guarantee they will return to NCO contracting positions. Therefore, the Army receives minimal benefits associated with the cost of training.

To achieve a higher return on investment, the Army should follow the lead of the USAF or USMC, where NCOs have a separate contracting MOS and begin their contracting training and experience early in their military careers. The USAF and USMC consider NCOs long-term assets, and accession into contracting early in their professional careers guarantees the highest cost-benefit ratio. The Army must develop the same professional career model.

Promotion Opportunities. NCOs who responded to a survey regarding promotion opportunities felt they were not as competitive in a contracting MOS as those who remained in their primary MOS. Currently, NCOs working in Career Management Field (CMF) 92 are required to pursue staff-related positions during their tenure as staff sergeants or sergeants first class. These positions include recruiter, drill sergeant, instructor, and contracting NCO. Promotion boards view "harder" staff jobs (recruiter, drill sergeant, and instructor) more favorably than "softer" staff jobs (contracting NCO). Therefore, NCOs who volunteer for the harder staff jobs have a greater chance for promotion than NCOs in the contracting field. Furthermore, harder staff jobs are considered leadership positions; positions held by NCOs in the contracting field are not. Thus, under the current structure, the situation is a lose-lose for both NCOs and contracting commands. Until promotion boards are educated on the importance of a contracting NCO as combat multipliers for our commanders, the current issues will remain.

Maintaining Critical-Task Skills

NCOs are required not only to maintain their contracting skills, but also to maintain their primary branch critical-task skills. This means that 92As (Automated Logistical Specialists) must keep up with as many as 85 critical tasks, including two separate computer systems. The 92Ys (Unit Supply Specialists) must maintain proficiency on 22 critical tasks. These numbers only refer to critical tasks and not to related subtasks within each critical task.

The depth of knowledge required by contracting NCOs is enormous when combining the primary branch critical task and contracting task. The surveyed 92As stated they could not keep up with the critical tasks in their primary MOS as well as their contracting tasks. Therefore, while NCOs serve in the contracting field, the knowledge of their primary MOS critical tasks diminishes. Upon returning to their primary MOS, they must relearn the entire spectrum of the designated critical tasks. How can the Army benefit under this condition?

MOS Background

Is it necessary for contingency contracting NCOs to have a logistics background? The majority of surveyed respondents indicated that personnel from other MOSs could indeed handle contracting NCO requirements, but a logistics background would assist in the transition. They also indicated that the Army should open the ASI G1 to all MOSs that are not critically short.

Based on this recent change and new direction for the contingency contracting NCO, a logistical background is not necessary. Contracting has something to do with logistics, but logistics has very little to do with contracting. One needs to look at the definition of contingency contracting and the employment of contingency contracting officers to realize they acquire everything from tractor-trailers to refrigeration trucks for deployed forces. Therefore, an 88M (transportation NCO) might have the advantage over a 92Y when leasing or purchasing transportation equipment in a contingency operation. The background of NCOs could range from mechanics, to cooking, to communications. Finally, drawing from noncritical MOSs would alleviate some of the problems now associated with NCOs coming from the CMF 92 field, which is a critical-shortage MOS Armywide.

Conclusion

This concludes part one of a two-part article. Part two will appear in the November-December 2000 issue of *Army AL&T* magazine.

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THE FUTURE OF MILITARY TOXICOLOGY

Dr. Akbar S. Khan, Dr. Kevin P. O'Connell,
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Introduction

U.S. soldiers operating in a chemical and/or biological weapon (CBW) environment face the possibility of exposure to CBW agents resulting in incapacitation or death. How chemical weapons cause acute injury is well understood, thanks to an exhaustive study of these compounds by toxicologists both inside and outside the Army during much of the 20th century. However, personnel involved in decontaminating equipment or destroying chemical weapons, as well as personnel on the periphery of an attack, may also face exposure at low levels that may not induce obvious damage at the time of exposure.

A more insidious health risk resulting from deployment in areas of the world where environmental regulations are lacking is exposure to toxic industrial compounds (TICs) and toxic industrial materials (TIMs). Contamination from TICs and TIMs that does not result in immediate injury may yet predispose soldiers to ailments that arise much later and whose origins are difficult to determine. This article briefly describes cutting-edge approaches to deal with these once-intractable problems in military toxicology, driven by the latest advances in genetic technology.

Toxicology And The Army

The Edgewood Chemical Biological Center (ECBC), the Medical Research Institute of Chemical Defense, and the Center for Health Promotion and Preventive Medicine at Aberdeen Proving Ground (APG), MD, are the Army's current lead agencies for toxicology. Laboratories at APG have been assessing the effects of chemical weapons, TICs, and TIMs on living systems for nearly 80 years. For most of that time, toxicology has consisted of chemical exposures to animals followed by observations of a limited number of physiological changes, including death. This work has provided a unique and valuable body of immediate, practical solutions to battlefield toxicological problems: decontamination, personal protection, and antidotes for acute exposures. However, traditional methods lack the ability to determine how toxic agents act fundamentally, at the genetic level. Two revolutions in biology now provide the tools to comprehensively examine the genetics of toxicology (genotoxicology), and the Army is uniquely poised to leverage these revolutions and fundamentally change the nature of military toxicology.

Revolution 1: Whole Genome DNA Sequencing

Laboratory groups led by the National Institutes of Health and Celera Genomics recently released draft reports of a landmark human scientific achievement, the sequences of the 100,000-plus genes that comprise the human genome (the entire collection of an organism's genes). The raw sequence data, the precise order of more than a billion A's, G's, T's, and C's (each letter representing one of the four building blocks of DNA (deoxyribonucleic acid)), are staggering. DNA sequences determine the structure and function of every protein in the human body, including those that respond to exposure to toxic materials. This flood of data presents molecular biologists with the challenge of interpreting the function and regulation of each gene. Another challenge is understanding how the natural variations in human genes give rise to natural human variations, including (most importantly for toxicology) toxin susceptibilities.

Until recently, the task of just enumerating genes appeared to be quixotic. The periodic table of elements is composed of only about 109 elements, but the genome of a mammal is enormous, comprising more than 100,000 genes. Just as the periodic table of elements summarizes chemical properties and predicts the nature of undiscovered elements, genetic databases are being built that group similar genetic sequences to predict the function of newly discovered genes. This "periodic table of genes" will not be two-dimensional, but will reflect similarities at multiple levels.

Primary DNA sequence data demonstrate that similar gene sequences often underlie similar functions and that variations between individuals allow us to determine identity genetically and may predict individual susceptibility to toxins. In an analogous fashion, DNA similarities between species will allow better correlations to be drawn between lab animal data and human toxicological outcomes.

Revolution 2: Genomics And Microarrays

Genomics is the name given to the simultaneous study of large numbers of genes and the use of DNA sequence data to predict biological and toxicological functions. It is well-known by molecular biologists that the level of expression of a particular gene is indicative of the importance of that gene in the life of a cell at a given time. Changes in gene expression, regulated by genomic sequences, therefore reflect changes in the molecular

processes working in a cell or tissue in response to external factors, including exposure to toxic materials. It is precisely this information that is lacking in our current understanding of toxicology. But how do we study the sequence and expression of tens of thousands of genes simultaneously?

The second current biotechnological revolution is a marriage of DNA chemistry, silicon chip technology, and optics, called DNA microarrays. Briefly, thousands of unique DNA molecules are applied by a robot to the surface of silicon wafers (approximately the size of a microscope slide). Up to 20,000 unique sequences can be bound per slide, representing 20,000 unique genes in a single microarray.

Genetic material (RNA (ribonucleic acid)) from an animal, human, or cell culture that has been exposed to a toxicant is then prepared, labeled with a fluorescent dye, and applied to the microarray. A computerized database keeps track of the identity of each gene present on the array. A comparison of two arrays to which RNA from toxicant-treated and untreated tissues have been added reveals the identity of genes whose expression has changed in response to the toxin.

Microarray analysis, therefore, tells the scientist what genes have been "turned on" or "shut off" by exposure to the toxin. The status of genes affected by exposure to the toxic material suggest their biochemical function in the cell's response to the toxic insult. The number of genes studied in such an experiment and the extent of their expression (measured by the intensity of a spot's fluorescence on a chip) present a computational challenge to the researcher, who suddenly becomes awash in data. An entire subdiscipline of computer science, called bioinformatics, has emerged in response to a need to mine, manage, and analyze very large DNA data sets.

Toxicology And Human Performance

Near-term applications of microarray technology abound in toxicology. The expression of perhaps 2 percent of human genes is regulated by exposure to toxic compounds. It is now clear that microarrays representing the expression levels of toxicology genes can be designed either as high-density arrays used to identify particular genes of interest for a particular application, or, subsequently, as low-density, high-throughput assays with a limited number of selected genes. This will revolutionize toxicology, especially in the assessment of low-level, multiagent exposures, because changes in gene regulation precede gross physiological or histological changes by weeks, months, or even years. It will soon be possible to assess whether individuals have been exposed to toxicants and to either remove them from the environment or initiate treatment long before damage occurs.

Genomics will enable the selection of personnel based on genetic predisposition. While the concept of selecting for, or making genetic modifications to induce, a "super soldier" is still in the realm of science fiction, identification of genes involved in such functions as stress response, metabolic efficiency, or chemical sensitivities will be used to assess suitability for particular assignments. For example, a gene related to enhanced sensitivity to organophosphorus pesticides and nerve agents has been identified and could be used to preclude assigning personnel with this genotype to handling such toxic materials. Similarly, personnel exhibiting superior genetic disposition for stress response might be selected for tasks requiring this trait. As the functions of genes and gene clusters are identified, genomic techniques that combine genetic arrays with advanced bioinformatics will have ever-expanding applications.

A third interesting area where genomics will have an impact is soldier training. Humans process information in a number of sensory modalities (e.g., visual, auditory, somatosensory), and individuals appear to have differing preferences or aptitudes for using these modalities. Screening individuals for their favored information processing mode, or assessing the task for suitability to be processed in a given modality and then presenting the information accordingly, will greatly enhance soldier training. Because the future soldier will be in an information-intensive environment, using multiple sensory modalities will be critical to increasing cognitive "bandwidth."

Conclusions

The deluge of DNA sequence data now arriving is opening avenues of research scarcely dreamed of 10 years ago. Following in its immediate wake will be a host of practical applications in toxicology, drug development, forensic science, and injury prediction and diagnosis. Genomics will soon result in healthier, more stress-resistant soldiers who are better screened and matched to their missions, and who will be treated more rapidly and with more confidence in the event of chemical or biological exposure or attack.

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REGREENING THE AAC OFFICER AT THE OPERATIONAL TEST COMMAND

MAJ Wally Tubell

Introduction

So, you're an Army Acquisition Corps (AAC) officer and have been away from troops for several years. Have you ever wondered where you might go for a "regreening" assignment? You might want to consider the U.S. Army Operational Test Command (OTC) at Fort Hood, TX, formerly the Test and Experimentation Command (TEXCOM). OTC's mission is to design, plan, conduct, and report on quality independent operational tests and experiments to support the user (soldiers), combat developers, and the Army in joint and multi-Service operations. According to command test management records, in FY99, OTC conducted 75 separate operational tests and experiments. These, together with ongoing planning for future tests, cost $71 million. OTC conducts operational tests and experiments on new equipment ranging from boots to the most advanced combat systems spanning the spectrum from acquisition category (ACAT) I with Office of the Secretary of Defense (OSD) oversight through ACAT IV.

According to the FY00 Military Acquisition Position List, OTC has 26 regreening assignment positions for AAC captains, 19 positions for AAC majors, and 5 positions for AAC lieutenant colonels. OTC pretty much covers the U.S. landscape, with its headquarters, staff support, and five branch-specialized test directorates at Fort Hood, TX, plus branch-specialized test directorates at Fort Bliss, TX; Fort Bragg, NC; Fort Sill, OK; and Fort Huachuca, AZ.

But wait a minute. You think, aren't operational testers the "bad guys"? Think again. True, our role as independent testers sometimes places us at odds with the program manager (PM). However, for the most part, we have been, we are now, and we will continue to be, a vital part of the acquisition team. With OSD and the Director of Operational Test and Evaluation placing more emphasis on early and upfront operational testing in support of spiral development, OTC's role on the acquisition team will undoubtedly grow.

First Impressions

My regreening began immediately upon arrival at Fort Hood. I was in for several surprises. After all, I had spent nearly 5 years in the Army Materiel Command (AMC)/program executive office (PEO) world. Like most AAC officers, I had grown accustomed to wearing the class B uniform, being a relatively junior officer in the organization, and being in the minority (military member) both at work and in the community. I had participated in several new equipment fieldings and readiness reviews, but generally, I had not worked closely with noncommissioned officers (NCOs) or soldiers during my time in the AMC/PEO community.

At Fort Hood, military personnel are plentiful both at work and in the community. I began wearing battle dress uniforms again, waited in long lines of soldiers during inprocessing, and participated in unit physical fitness training and military training as well. I drew TA-50 at the Central Issue Facility, although I only received about 25 percent of what the troops in the III Corps received. What amazed me the most, however, was how many inoculations I needed! I was well on the way to regreening myself in just a few days. OTC keeps officers, NCOs, and soldiers assigned here, remembering they are soldiers first. Although OTC is a table of distribution and allowances (TDA) organization, it has the feel of a modification table of organization and equipment (MTOE) unit in many ways.

At first glance, OTC seemed no different than my previous workplace at the U.S. Army Tank-automotive and Armaments Command with the exception of the larger number of military personnel. As I began working with combat developers and test units, I quickly developed a sense for how much the Army had changed since I left the ordnance branch for the Acquisition Corps. I also found that as an operational test officer, I would be planning training, developing master event lists and tactical scenarios, and running ranges, etc., much like a battalion operations officer (S3). I don't mean to say that a test officer's job in OTC is the same as a battalion S3, but there are similarities. I certainly gained a whole new perspective on acquisition and soldiering at OTC. OTC afforded me the opportunity to reacquaint myself with the MTOE Army I left behind in 1992 when I became an AAC officer. When I leave OTC for my next permanent-change-of-station position, I will be much more in touch with the ultimate acquisition customer, the soldier, because of what I learned at OTC.

A "Wolverine" heavy assault bridge crosses its own bridge during a LUT conducted by the 4th Infantry Division at Fort Hood earlier this year.

Myths Dispelled

In my prior AAC assignments as a materiel developer, I had little or no contact with the operational side of the U.S. Army Test and Evaluation Command (ATEC), the parent command of OTC, formerly called the U.S. Operational Test and Evaluation Command (OPTEC). I therefore subscribed to the myths about the operational testers as "bad guys" out to break my product. Once I reported for duty, I quickly found that the soldiers and civilians at OTC are truly impartial professionals. I also found that OTC personnel are team players who want to help a PM's products do well in operational testing, particularly when they can actively participate on the PM's Test Integrated Product Team (TIPT) early in the life cycle. This was a surprise to me because the conventional wisdom in the PM world seemed to have been the opposite. Operational testers are not driven to break products or see them fail. Rather, operational testers are driven to conduct stressful, realistic tests to determine if products are effective, suitable, and survivable in the hands of the ultimate customer, our soldiers. Whether a product passes or fails an operational test is not a concern to the operational tester. The soldier is the operational tester's main concern. The key to leveraging OTC's unique skills and abilities is early involvement in the PM's TIPT.

Advice And Lessons Learned

Now that I am a tried and true tester, I'd like to offer some advice and lessons learned to my fellow associates in the materiel development community. First and foremost, regardless of the program, regardless of the level of maturity, include an OTC operational tester as well as an operational evaluator on your TIPT as early as possible. The operational tester can offer sound advice to reduce your product's risk of performing poorly during the initial operational test and evaluation (IOTE) prior to the Milestone III production decision.

In addition to developmental testing, consider conducting a customer test at any time, an early user test and evaluation prior to Milestone II, and/or a limited user test (LUT) prior to the IOTE and Milestone III. ATEC/OTC involvement in these experiments will pay off in the long run for those programs that transition to traditional acquisition programs or enter the U.S. Army Training and Doctrine Command's Warfighter Rapid Acquisition Program. These operational tests and experiments allow PM and contractor involvement to varying degrees and can provide lessons learned, resulting in a better performance specification and a more mature product for the all-important IOTE.

A forward repair system (FRS) crew working with a Bradley crew to repair and replace the Bradley's powerpack during the FRS IOTE with the 4th Infantry Division at Fort Hood in February 2000.

Early operational tests are certainly not cheap, and ATEC may or may not be able to fund the testing. Rather than viewing the dollars spent as a cost, consider them an investment in the product. Many of you will recall one of the standard answers from the Materiel Acquisition Management Course was "early in the life cycle." Usually the question for that answer was focused on logistics or manpower and personnel integration, but the slogan "early in the life cycle" applies just as well to operational testing. Nothing can reduce program risk more effectively for the IOTE than a solid test plan that includes a robust developmental test and some form of early operational test. This is perhaps the most important lesson I learned at OTC.

Conclusion

During a 2- to 3-year assignment at OTC, an AAC captain or major can expect to serve as test officer on several tests and as a test operations officer or data collection officer on several others. Much like a PM, you will manage the cost, schedule, and performance of three products: the test plan, the record test itself, and the test report. During each test, you will spend a significant amount of time working with test units and their soldiers. You will get a personal look at how today's soldiers will employ tomorrow's systems. You will also gain a strong appreciation for the pressures today's commanders and units are facing given our reduced force structure and ever-increasing training and worldwide mission responsibilities.

Spend some time with an MTOE unit today and you will quickly realize that today's Army is stretched much more thinly than was the Army of the late 1980s and early 1990s. I am convinced AAC officers will be better acquisition officers for having served at OTC for two reasons. First, AAC officers at OTC will thoroughly reacquaint themselves with soldiers, doctrine, and the table of organization and equipment Army. Second, you will learn firsthand through practical experience another phase of the acquisition process. These two lessons will serve me well in the future regardless of where my career takes me. I highly recommend any captain or major in the AAC request an assignment at OTC. For more information on OTC, visit their Web site at **http://www.otc.army.mil/otcweb/MainOTC.htm**.

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THE NEW WORKFORCE DEFINITION

Tim McClellan and LTC Scott Lambert

Introduction

For years, there has been considerable controversy regarding the composition and size of the DOD Acquisition Workforce. Consequently, various definitions have been used to identify the workforce with no real consensus by either the individual Services or the Office of the Secretary of Defense (OSD) on what actually constitutes the Acquisition Workforce. As such, in an effort to resolve this long-standing issue, in May 1997, the Office of the Under Secretary of Defense for Acquisition and Technology contracted with Jefferson Solutions to develop a methodology for defining the various elements of the workforce.

Jefferson Solutions recommended that the workforce be identified using an updated and modified version of an approach developed by the 1986 President's Blue Ribbon Commission on Defense Management (the Packard Commission). The Jefferson Solutions' methodology builds on the Packard Commission model that uses occupational and organizational data to identify the workforce. In compliance with the Defense Secretary's direction to refine the model so that it is consistent among all the Services and OSD, a DOD Acquisition Workforce Identification Working Group was established in December 1997.

The Refinement Process

From December 1997 through March 1998, numerous modifications were made to the model. Any functions that could potentially impact the acquisition lifecycle process were examined to precisely identify which occupational areas and organizations to include in calculating the size of the workforce. An initial and secondary sizing calculation provided the working group an opportunity to refine both the occupational and organizational lists used in the workforce identification model.

The refined model includes only key acquisition and technology workforce members, not clerical or support personnel. The model uses three categories (Category I, II, and III) to identify personnel by occupational area based on function and applies to all DOD organizations. Category I includes certain occupational areas across all DOD organizations (e.g., contracting). Category II is composed of specific occupational series in specific organizations and is divided into two subcategories (IIA and IIB). Category IIA includes occupations in mainstream developmental organizations (e.g., program executive offices and program management offices). Category IIB is composed of occupations in research and development (R&D) organizations. Category III is used to add any key acquisition and technology positions not listed above or to delete any Category II positions that are not applicable.

New Definition

Using data from the two sizing calculations, the working group developed a process to identify acquisition functions. These acquisition functions apply to all DOD organizations.

Requirements Development; Systems Planning; Research, Development, and Engineering; Test and Evaluation; and Science and Engineering. Work performed in these areas is primarily related to direct support of acquisition programs, projects, or activities. The duties and functions of the scientists, engineers, and other personnel in these areas usually involve providing direct support for acquisition efforts, especially in R&D organizations. In addition, the duties of these positions normally require performing work related to the design, development, fabrication, test, and modification of systems or system components. This area also includes services, engineering, and construction for facilities and installations.

Program Management. Work performed in this area is primarily related to overseeing acquisition programs or management of the DOD acquisition process.

Information Technology (IT). For the purpose of defining the workforce, the IT workforce includes personnel responsible for acquisition, management, and oversight of equipment used in the automatic acquisition, storage, manipulation, management, movement, control, display, switching, interchange, transmission, or reception of data or information. IT includes computers, ancillary equipment, software, firmware, and similar procedures, services (including support services), and related resources. IT also includes telecommunications and communications equipment and national security systems and interoperability between and among systems.

Industrial/Contract Property Management. Work performed in this area is primarily related to supporting contractual requirements involving acquisition, control, management, use, and disposition of government-owned property

provided to contractors. Duties in this area may also include performing pre-award surveys, reviewing property management systems, and plant clearance operation.

Contracting and Procurement. Work performed in these areas primarily involves procurement of supplies and services; selection of sources; negotiation, administration, and award of contracts; lease of supplies and services; and similar activities. It may also involve clerical and technical support for purchasing, contract negotiation, and contract administration.

Production. Work performed in this area involves acquisition-related manufacturing, production, and quality assurance. Acquisition-related manufacturing and production duties usually involve management or monitoring of the manufacturing and production efforts of contractors. Quality assurance includes such duties as evaluating DOD contractor compliance with the technical and quality requirements of acquisition contracts, performing analyses of contractor data, and performing quality engineering.

Contract Auditing. The basic nature of contract auditing makes this area an acquisition function. This functional area is comprised of the contract auditing (511) occupation, which has been centralized in the Defense Contract Audit Agency.

Business, Cost Estimating, and Financial Management. Work performed in this area is primarily related to direct or indirect support of the previously listed acquisition functions when, and only when, these duties and functions are found in Category II organizations. The business, cost estimating, and financial management area includes, but is not limited to, occupational areas such as budget analysis, general business and industry, and mathematics.

Management and Administration. Work performed in this area is primarily related to direct or indirect support of the previously listed acquisition functions when, and only when, these types of duties and functions are found in Category II organizations. The management and administration area includes, but is not limited to, occupational areas such as budget analysis, general business and industry, and mathematics.

Logistics Planning and Management. Work performed in this area is primarily related to direct or indirect support of acquisition programs, projects, or activities. The duties and functions of occupations such as logistics management specialist (346) and supply program manager (2003) in this area primarily involve acquisition activities. Property disposal officer (1104) and property disposal clerical (1107) should also be considered Acquisition Workforce categories when the disposal involves major items or systems, hazardous materials, and high-cost items, or when the disposal involves complex management of contracts or money. At this time, however, areas such as retail supply control, warehousing, and storage; as well as operational, intermediate, and depot-level maintenance; are not considered to be acquisition functions, but efforts are ongoing to correctly evaluate their inclusion as part of the Acquisition Workforce.

Importance Of The Sizing Calculation

The Jefferson Solutions model calculates the number of people, not positions. These numbers are critical to management and future planning to fulfill education, training, and career development requirements for key acquisition and technology workforce personnel. As in any database, the numbers are only as good as the data in the database. That is why it is important for each component to perform a thorough validation and/or revalidation of its workforce each year. The more accurate the calculation, the better the planning will be to provide a trained and educated Acquisition Workforce.

The result of applying the new definition to the workforce is an increase in the total number of acquisition professionals. In the short term, this sudden increase will impose a challenge to DOD in meeting training and education requests, which will be closely managed. For example, there may be increased competition for class seats, particularly in resident courses at the Defense Acquisition University (DAU). The Army Acquisition Career Management Office (ACMO) is working closely with DAU to ensure that all workforce professionals receive the training and education they require at the right time in their career.

Conclusion

When fully implemented, this model will effectively provide DOD a consistent, uniform, and verifiable means to identify, manage, and train the acquisition and technology workforce members. It will also provide greater clarity of the roles of workforce personnel and a more effective personnel management system.

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RECURRING LESSONS IN WEAPON T&E PROGRAMS

Thomas H. Hoivik (USN, Ret.)

Introduction

Test and evaluation (T&E) in acquisition has long been a subject of research interest among students and faculty at the Naval Postgraduate School (NPS), Monterey, CA. Over the years, NPS researchers have studied T&E in a number of major system acquisition programs, including the Abrams Main Battle Tank (M1A2), the Javelin Anti-Armor Weapon System, the Enhanced Position Location Reporting System, the Avenger Air Defense System, the Kiowa Warrior armed scout helicopter, the Maneuver Control System, the Family of Medium Tactical Vehicles, the Air Defense/Anti-Tank System, and the Apache (AH-64) Attack helicopter. These programs represent several different types of systems ranging from electronic and data communications and software to major weapon systems. They also represent different types of developments, including system upgrades, nondevelopmental items (NDIs), and full-scale developments.

These research projects indicate that several developmental and operational T&E issues recurred in system acquisition programs during the past decade. This article provides a summary and brief overview of significant issues identified by the author and several NPS students. More detailed analyses and findings may be found in two NPS Master of Science theses: *A Comparative Analysis of Developmental Test and Evaluation in the United States Army* by Arthur J. Aragon Jr., USA; and *An Analysis of Weapon System Readiness for Operational Testing* by James B. Mills, USA.

Sources for these research efforts included program management office (PMO) personnel, program testers, analysis personnel, user representatives, and contractors participating in T&E of the major programs selected. Research included reviews of after action reports from Service T&E agencies, lessons learned reports of major systems, General Accounting Office (GAO) reports, Congressional subcommittee reports, developmental test and evaluation (DT&E) and operational test and evaluation (OT&E) reports, and technical and professional journals.

Recurring T&E Issues

Our research indicates that five significant issues and problem areas exist in conducting T&E programs. In order of significance, these T&E problem areas are:

- T&E schedules,
- The acquisition process,
- Test culture,
- Resource management, and
- Changing requirements.

Additionally, the type of development strategy, such as the use of NDI or system upgrades, may influence which of these problems is most prevalent.

Scheduling Issues

Scheduling difficulties continue to be the most common and significant problems in conducting T&E. These problems are caused by an acquisition process that emphasizes completing the test on schedule rather than conducting the test according to plan. This leads to overoptimism and, thus, unrealistic schedule estimates. The process may cause program managers (PMs) and their staffs to develop unrealistic T&E schedule estimates without considering historical tests or the experience of the tester and analyst. The PM's overoptimism in planning and scheduling also forces other agencies to set unrealistic plans or schedules that are based on meeting aggressive schedules. Furthermore, because of excessive schedule "push," usually by the PMO, many systems are not fully configured or ready for testing.

Acquisition Process Issues

Nearly every agency named the acquisition process itself as a significant stumbling block to conducting robust T&E programs, as well as being a cause of other related problems. The reasons for these problems included the funding process and PM overoptimism. The funding process rewards PMs for being on schedule, being under budget, and meeting the criteria of the next milestone. It does not reward PMs for being critical and objective about their systems, nor does it reward them for taking a user perspective. The acquisition process drives PMOs to focus on cost and schedule and to sometimes regard T&E as an opportunity to recoup time and money. Because many systems are competing for limited Defense dollars, PMs are having to understate the actual technological risk in programs to stay competitive; therefore, they cannot include all the needed testing in their acquisition or test plans. This may be a result of decisionmakers placing programs "at risk" of cancellation if they perceive too much development risk in a program.

Test Culture

Research has found that a negative test "culture" exists in many PMOs, and this culture may have been the basis of testing problems. Several PMOs, and sometimes contractors, have displayed a negative attitude toward testing, testers, and analysts. The representative causes noted for this problem included the acquisition process itself, lack of PMO understanding of test and analysis capabilities and constraints, and the assumption that

testers and analysts always require more or excessive testing. However, it was also found that some testers and analysts have earned poor reputations among program offices by conducting tests that appeared to add no value to the process or testing for weapon capabilities that were beyond the design requirements.

Resource Management

For many Army, Navy, and Air Force systems, a majority of the problems that occurred during OT&E were directly related to test resource issues. GAO cited 27 cases where important test resources were limited or not available for testing. In spite of this apparent history of problems, resources still do not appear to receive the attention they deserve, and testing usually remains underfunded.

Resource management of critical test assets was also identified as a major problem in DT&E. The primary causes of this problem included short-term funding and limited resources (hardware and software). A system entering DT&E without adequate test funding may not receive the resources in the lead time needed for proper test conduct. Lack of funding could delay test setup, delay instrumentation and equipment checks, and reduce needed test support personnel.

Short-term funding also caused PMs to desire and plan for near-perfect success in their test programs. Part V of the Test and Evaluation Master Plan (TEMP) details the resources required; however, it appears that resource requirements do not get the attention they warrant. Systems under development are often constrained by limited prototypes, test models, and versions of software, and they may be spread across the country. The lack of resources can severely limit effective testing, evaluation, and reporting.

Changes In Requirements

Changes in requirements were identified as a major problem for T&E. The causes for this included lack of coordination and/or communication between agencies and the lack of understanding of DT&E and OT&E processes among some combat developers. Lack of communication and coordination resulted in documents such as the Operational Requirements Document, the TEMP, and the contract not matching in terms of requirements. This dichotomy has caused difficulties in defining test requirements and made test planning and the conduct of tests more difficult and expensive than originally estimated. Combat developers may not be totally familiar with the test process and may not realize the impact that a less than fully coordinated requirement change has on the T&E process.

Other Findings

NDI And System Upgrade Programs. Another finding from our ongoing research is that a system's development strategy may be related to the type of problems a system encounters. It appears that PMs and decisionmakers usually underestimate the actual T&E required for NDI and system upgrade programs. One of the main causes for this underestimation is that these types of acquisition programs tend to promote very high expectations among PMs, senior decisionmakers, and other agencies. It is usually perceived that NDI and system upgrade programs are less risky and, therefore, any T&E problems of these programs should be minimal (although the contrary is more likely). As a result, if T&E program problems arise or failures occur, senior decisionmakers, other agencies, and even Congress may increase scrutiny, reassess the system, or place the program "at risk" for cancellation. Therefore, some PMOs want to significantly reduce testing to limit their exposure to possible failures and increased scrutiny.

Early Involvement Of Test Participants. Early involvement of the tester, analyst, and combat developer is critical to minimizing and/or preventing T&E problems. Having the PMO bring these agencies in early to help estimate, plan, and coordinate the test effort was the most common recommendation made across systems, agencies, and all categories of programs.

Additionally, there is benefit to having test personnel available during requirement writing to ensure that requirements are "testable" or at least capable of being evaluated.

T&E Is A Risk-Reduction Tool. It has often been repeated among testers that decisionmakers need to fully understand the role of testing in the systems engineering process. As a risk-reduction tool, the test process should identify and eliminate unfeasible alternatives during high-technology program development. Therefore, some system failures during development testing should be expected and should not put a program "at risk" for cancellation when they occur. PMs and contractors should also realize the value that DT&E provides to their development effort and should push for more testing rather than less.

Conclusion

Several recurring lessons have surfaced over the years during the evaluation of weapon T&E programs, including the following:

- The PM should start test planning earlier with all the cognizant players and agencies represented, including the tester, the analyst, the contractor, and the combat developer.
- Historical information and data from previous tests should be used to better estimate future test costs, schedules, and resource requirements.
- PMs should plan for contingencies and not assume perfect success in the test process, while testers should demonstrate more flexibility in packaging test programs.
- PMs, as well as others, should avoid underestimating DT&E requirements for NDI and system upgrade programs.
- Decisionmakers should fully understand the risk reduction role of T&E in the systems engineering process. They should expect some failures to occur in DT&E and not place a program "at risk" for cancellation when a failure occurs.

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BEYOND THE TWI TRAINING PLAN

MAJ Matthew T. Riordan

Introduction

After the Army Acquisition Corps (AAC) selected me for a Training With Industry (TWI) position, one of my AAC peers asked, "What does TWI really mean?" We both had read about the program in *Army AL&T* magazine and met officers who had the opportunity to work 10-12 months in private industry. Additionally, we both knew it was a once-in-a-career opportunity to develop skills and gain experience that would enable me to exercise superior business judgement in the Army acquisition community.

The *Army AL&T* articles I read in preparation for my TWI tour were excellent, but I wondered what kind of "outside-the-box" professional development experiences were available for TWI participants.

I recently completed my TWI tour with Boeing Aircraft and Missile Defense Systems Division in Duluth, GA. While there, I worked in areas "beyond my training plan." I thought it would be interesting and beneficial for *Army AL&T* readers to get an idea of these experiences. Thus, the intent of this article is to pass on some "nuggets" from my TWI tour by describing the training I accomplished and summarizing valuable lessons learned.

Leadership Center

The Army places a lot of emphasis on leadership, and I've become a follower of leadership training programs by default. To understand Boeing's organizational culture, issues of concern, and company events, I routinely reviewed the company's local and corporate newsletters. I read an article about the company's new leadership center and thought it would be a great experience to visit the center. I could then provide the company with feedback on their leadership training program. Because the center was new and there was a backlog of managers scheduled to go, I wasn't sure I'd be able to attend.

As things worked out, however, I attended a 3-day course at the leadership center. This opportunity allowed me to compare industry's approach to developing leadership from within to the Army's approach. The company's intent in establishing the leadership center was to make attending a course pleasant and beneficial for all parties. To do this, the company provides students onsite living quarters, food, and entertainment so they can focus on learning. In addition, the visual-aid devices and the computer-based situational exercises are first-rate. This is one of the most effective teaching approaches I have ever experienced. Finally, the experience of interacting with midlevel managers from corporate offices around the country was very enlightening.

International Studies

While evaluating the technical library, I found the company maintained an incredible amount of information for employees, including monthly magazines on everything from foreign efforts to meet Defense needs to microchips. As Defense contractors continue to merge, some training materials become obsolete because they existed before the merger. As a student, I continued to review these materials and found a goldmine. For example, I found videos containing more than 35 hours of training material that the former company paid two international lawyers to produce. This training included a historic, economic, Defense, and marketing perspective of seven U.S.-friendly countries. I wouldn't want to guess what it cost to have these now-dusty videos produced, but I was glad I "stumbled" on them.

Multitasking

During my TWI tour, I received a lot of training on the theory of constraints/critical chain and the concept of multitasking. A management view widely accepted is that if someone is not continuously working, we are somehow losing productivity, money, and time. Moreover, if employees do not have a full queue of work, they are sometimes viewed as not effectively managing their workload. Although it is impossible to summarize everything I learned, one exercise stands out in my mind.

TWI participants were given two projects (Project A and Project B), and told to go through the exercise three times. First, we started on Project A, and after 30 seconds we were instructed to work on Project B simultaneously. To equalize the workload, we were instructed to use the same quantity of items (marbles) on each project (e.g., move three marbles on Project A, then three on Project B; move three on A, then three on B). (See the table on Page 38 for results in minutes.)

As the results indicate, the entire project (Projects A and B) took less time the longer a person was allowed to focus on one project at a time. This concept seems elementary, but how many times does someone work on two projects simultaneously in an attempt to get both projects completed more quickly? Additionally, the instructors used a

	Exercise 1			Exercise 2			Exercise 3		
	Start	Finish	Duration	Start	Finish	Duration	Start	Finish	Duration
Project A	NA	9:51 mins	9:51 mins	NA	7:10 mins	7:10 mins	NA	5:01 mins	5:01 mins
Project B	30 secs	10:25 mins	9:55 mins	1 min	8:50 mins	7:50 mins	2 mins	6:50 mins	4:50 mins
			20:16 mins			15:00 mins			9:51 mins

software program to illustrate the effects of different percentages on an actual weapons system in production. The effects were dramatic and worthy of further reviewing the concept of multitasking.

Statistical Process Control

During the time I was with Boeing, they decided to relocate and close down our site. I saw an opportunity to serve as a "filler" while they transitioned, and I soon led an effort to analyze a production problem. The company provided me access to the existing production databases and to the current production models and simulations. Within 6 weeks, we developed a spreadsheet to plainly highlight and project process bottlenecks 30 days in advance. This spreadsheet was 80-85 percent accurate and assisted the company in meeting its gain-sharing goal. The ability to see production tracking systems at the working level and to develop an actual system from theory was very informative.

Make Versus Buy

I volunteered to put together a "make-versus-buy" business case for one of the electronic items the company produces. Such a comparison for this item had never been done before. Like an A76 commercial study, if the business case showed that a certain percentage of savings would result, the work would be outsourced and some of the employees could be out of work. I learned a lot about the corporate business-case process common in the Defense industry. This assignment exposed the internal politics within the corporation and allowed me to experience what it would be like to decide the future of the company.

Conclusion

The Boeing Co. was very helpful in all I accomplished and learned during my TWI tour. The TWI Program is an excellent way to teach acquisition officers and civilians much more than what is in their training plan. Although it is difficult to summarize a year of training, I hope I have shared some information that will be useful to the reader. My objective in writing this article was to provide return on investment to the AAC for allowing me to participate in the TWI Program.

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Applying For TWI Programs

To learn more about the TWI Program for officers, refer to the Acquisition Management Branch home page at **http://www.perscom.army.mil/opfam51/ambmain.htm**. Click on **Training and Education**, followed by **Training with Industry**. This site provides TWI Program application information. A TWI selection board is held annually in January. For more information, contact Paula Bettes at (703) 325-2760 or DSN 221-2760.

Civilian members of the Army Acquisition Workforce interested in the AAC's civilian TWI Program should refer to the Acquisition Education, Training and Experience Catalog at **http://dacm.sarda.army.mil/careerdevelopment.** Scroll down to **V. Experiential and Developmental Opportunities** and click on **Civilian Training with Industry**. This site provides information on the civilian TWI Program. For information on the TWI application process, contact Jim Welsh at (703) 604-7116 or DSN 664-7116.

INTERNATIONAL COOPERATIVE PROGRAMS: A FORMULA FOR SUCCESS

Lawrence R. Geldmeier

Introduction

The Latin saying "all roads lead to Rome" takes on new meaning as we seek to improve the acquisition process during a period of serious resource constraints and downsizing initiatives. The goal is "to get to Rome," but the roads we take may differ, as do the chosen processes for developing and procuring a major weapon system for DOD. The preference for which "road" we take is clearly delineated in DoDD 5000.1, *Defense Acquisition*, which lists explicit prioritization of four alternatives to our historical preference for U.S.-only programs.

This article will focus on the second of these alternatives, the cooperative development of a U.S. military system with one or more allied nations. According to Assistant Secretary of the Army for Acquisition, Logistics and Technology Paul J. Hoeper, international cooperation is important because of recent trends toward coalition activities, budgetary constraints, and the macroeconomic trend toward globalization. Hoeper said that development of a world industrial base is most important because many "cutting-edge" products have an international pedigree.

The real crux of the matter, however, is economic. We simply cannot afford to maintain our national Defense industry to the same extent we did in the past. Al Volkman, Acting Deputy Under Secretary of Defense for International and Commercial Programs, stated unequivocally during the April 1999 Les Echoes Conference on Restructuring and Transatlantic Links that "the Defense industry in the United States [was] restructured out of necessity. After the Cold War, the procurement budget was reduced by two-thirds." He added, "As Europe's Defense industry continues to consolidate, there will also be the opportunity to harmonize European military equipment requirements with those of the U.S., and to achieve significant cost savings through economies of scale." Given that international programs are desirable because of resource constraints and an increased emphasis on coalition warfare, what are the earmarks of successful programs?

Attributes For Success

The first such attribute is that successful international programs have established mutually agreed-upon requirements at the outset. International cooperative programs increase in difficulty relative to the length and scope of the development. The shorter the development cycle and the less technical risk involved, the greater likelihood of success. If a major international program is to be undertaken, then consensus for program requirements must be achieved early for a program to remain on schedule. Perhaps one approach is to back into the requirements from what is technically feasible or commercially available, which negates risk and shortens the developmental cycle.

The successful international program also requires both national and international steering groups (i.e., decision-making bodies). These groups must be empowered to make binding decisions for their respective governments and for the program as a whole. If decisions cannot be made in a timely and decisive manner, the program may become mired in bureaucracy or be thrust into the political realm where it may be terminated because of its lack of clarity or purpose. Thus, a key ingredient for success is an empowered decisionmaker.

Another key to success is to establish a funding stream for the life of the program, or at least through the developmental phase. Nothing does more to undermine a program's credibility than does a belief that a nation or nations are not committed to system development. Commitments are reflected in dollars and cents where funds are obligated and contracts awarded. The earlier such commitments can be made, the better. If programs require a Memorandum of Agreement and obligation of funds for each phase of program completion, it is highly probable that the program will be delayed because of increased staffing measures. Legal restrictions, however, may require that certain clauses or terminology be inserted in memoranda or contracts to provide an escape mechanism, but these should be downplayed as much as possible.

Congressional support is key to the budgetary process because only Congress can approve monies for DOD participation in international Defense programs. To that end, Congressional staffers should be kept informed of program development, especially when "good-news" stories can

Successful programs are those that have incorporated proven incremental changes in technology rather than those that have incorporated quantum-leap jumps in technology.

be relayed. This will keep the program in a positive light and increase the chances that required funding will continue as the program progresses.

Additionally, technology and information release concerns should be addressed early and throughout all stages of program development. To accomplish this, a clear release policy must be established and be supplemented with implementation guidance from program participants. Exceptions to the National Disclosure Policy (NDP) must be initiated as soon as possible, if required. Also, program protection safeguards must be promulgated that will govern information and data release in light of NDP considerations. One strategy is to identify technical information already available worldwide. Then, resources can be focused on prescribing security precautions for required background information to be brought to the table initially or for foreground information generated during system development.

Contractors should be relied on for system development and should not be micromanaged because this will lead to mistrust and resentment. However, periodic reviews should be conducted to ensure that contractors are progressing on schedule and within budget. At the earliest opportunity, steering groups should resolve any problems that cannot be resolved in-house. As facilitators, project offices must make adequate provisions for coordination among the players in joint ventures and other collaborative efforts. Thus, the project office should integrate the entire effort and ensure that all nations and their contractors are collectively responsible for program completion.

Technical risk must be minimized as much as possible. Successful programs are those that have incorporated *proven* incremental changes in technology rather than those that have incorporated *quantum-leap jumps* in technology. What represents an acceptable risk in terms of striking a balance between what is feasible and what is desirable? If the risk is viewed as unacceptable from the outset, the program may be doomed to fail if technical solutions cannot be found within the projected timeframe.

One of the best tools to devise a successful acquisition strategy that minimizes risk is a knowledgeable and experienced staff. International program offices must be staffed with personnel who are familiar with working in an international environment and demonstrate the requisite flexibility to adapt to changing conditions that typify such endeavors. This approach avoids repeating mistakes made by personnel unaware of cultural differences that could engender adversarial relationships and, in turn, hamper overall program development. Moreover, such experienced personnel tend to integrate with the program office as a whole and, thus, become more committed to program completion. They are also familiar with technology transfer issues and program documents such as Memorandums of Understanding. Because high turnover rates disrupt programs through discontinuity, personnel should be encouraged to remain with a program through its completion.

Organizational structure is also significant to the success of an international program office. NATO structures tend to be less rigid and constrained than national structures. Thus, the "pilot-nation" approach should be avoided because it ingrains the program office into the host-nation bureaucracy.

Conclusion

These recommendations are not panaceas that will cure all the ills associated with international programs. They do, however, portray a number of guidelines that will make these programs more viable by increasing the likelihood of success. In the long term, successful international programs will be those that have harmonized requirements, empowered project officers or steering groups who are experienced in international program management to make key decisions, resolved technical data transfer issues, minimized technical risk, and charged industry with the technical development of systems. As in "traveling to Rome," there may be many roads, but the one best followed is the one without the ruts, forks, and switchbacks that have typified many international acquisition programs in the past.

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USING A GROUP DECISION SUPPORT SYSTEM FOR DOD Y2K CONSEQUENCE MANAGEMENT

Alan E. Barrick, Eric G. Heilman, and Robert Harder

In preparing for the year 2000 (Y2K) transition, DOD needed to devise a flexible consequence management process that could respond swiftly to possible crises. To support this effort, the U.S. Army Research Laboratory (ARL) provided the software tools, training, and support for a Group Decision Support System (GDSS); that is, an interactive computer-based environment that helps widely dispersed teams make decisions.

Large corporations often depend on the contributions of team members who may be located at various sites. Software collaboration tools allow team members to work together, both simultaneously and in parallel, with greater success. The system used in this instance was a software suite called "Group Systems," developed by *GroupSystems.com* (formerly Ventana Corp.).

GDSS

GDSS provides an environment that can accommodate multiple users with differing perspectives, differing values and beliefs, and little in the way of "hard data," all working under time constraints. GDSS methodology is powerful because it supports dialogue among the stakeholders working on the problem. Only through such dialogue can solutions emerge.

The group systems environment provides a structure that streamlines the meeting process and consolidates distributed team efforts. Each "meeting" encompasses a number of areas: an *agenda* area describing the steps necessary to achieve a goal, an area for *background information*, a *people* area to control meeting attendance, a *report* holding area, and a number of tools for brainstorming.

Sometimes meeting members "talk all at once" by typing their ideas simultaneously into a network of computer workstations. The system immediately makes these inputs available to other participants in the group. This allows the entire group to "hear" from every member in about the same time that it would normally take to hear from only one. Anonymity allows participants to evaluate an idea based on its merits rather than on its source.

The system also allows for contributions to be fully identified, which may be a more suitable approach in certain circumstances. For example, it may be useful for other meeting members to assess the expertise of the contributor, or contributors to be held accountable for their responses. These features and their flexibility enable a widely dispersed team to apply solutions efficiently and completely.

For the Y2K effort, each major entry in the system was designed as an event. The collaboration environment structure allowed for multiple taskings of an event, handouts, attachments, discussion areas, signature pages, and logs. Events were designed as responses to any type of crisis that could have been affected by a Y2K problem—such as acts of nature (i.e., earthquakes, major snowstorms, etc.), computer viruses, terrorist activities, as well as any major request for Y2K support.

The Y2K team used a networked system of standard computer hardware and commercial off-the-shelf software consisting of a dual Pentium (400 MHz) with 2 GB of memory and mirrored drives. A Microsoft NT terminal server and metaframe were used for the operating system environment. A special version of Group Systems Online allowed for continuous connectivity, operating on DOD's Secret Internet Protocol Router Network. Users communicated via a browser with a small software application.

Y2K Consequence Management

The Deputy Under Secretary of Defense for Policy Support was responsible for coordinating the DOD Y2K consequence management effort. Various organizations assisted: the Command, Control, Communications and Intelligence Y2K Decision Support Activity; the Office of the Secretary of Defense (OSD) Executive Support Center (ESC); the OSD Office of the Executive Secretary; and several principal staff agencies (PSAs).

ARL's role was to assist the PSAs in coordinating responses to Y2K events and documenting records of actions taken. ARL's representatives began involvement in the DOD Y2K consequence management effort in May 1999. ARL's first task was to map the process (suggesting changes where appropriate) to the collaboration tool. This involved interviewing

GOALS	RESULT	RESPONSE FROM USERS
Goal	Met	(Source: DOD PSAs / Organizations via GDSS feedback)
Monitor status and report progress of Y2K issues, both within DOD and externally	✓	All users reported ability to monitor taskings and information concurrently–"the system got information moving quickly between diverse agencies."
Identify potential or actual problems on a timely basis	✓	Users recognized "the value of concurrent processing versus sequential processing of actions. All were kept informed."
Respond to any problems expeditiously	✓	Users recognized the value or collaboration (rapid information transfer) between distributed/geographically separated users–"more efficient than e-mail."
Maintain a consistent flow of fact-based information within DOD	✓	System assisted in the sorting of "real issues from background noise." The system is capable of handling far more complex situations.

Y2K Team Goals And User Responses

Reserve officers and the ESC Director and Deputy Director. ARL process mapping incorporated feedback from several Reserve Watch Officer walkthroughs and training sessions. Four separate rehearsal exercises helped ARL to design the Y2K collaborative environment.

The ARL team included a core of GDSS collaborative software experts and personnel trained in its use. During the 7-month period before Jan. 1, 2000, the ARL team developed the internal GDSS capabilities within DOD's organizational infrastructure.

In a hierarchical organization such as DOD, which clearly has defined authority and responsibility, formal relationships and administrative systems governing the organization are defined through guidelines, procedures, and policies. Information and technology define the processes through which members achieve outcomes.

Effective event management, such as for the Y2K effort, depends on the coordinated collection, analysis, and dissemination of specified information. For the Y2K effort, the GDSS did not replace but augmented the existing lines of communication and information flows to and from the DOD PSAs. The DOD PSAs and organizations used the GDSS to monitor actions, consolidate inputs, and develop a DOD-coordinated response during the Y2K transition period.

During the formal Y2K transition period from Dec. 30, 1999, to Jan. 4, 2000, no major requests were made for DOD resources. (As we all know now, Y2K preparations were eminently successful and no major crises arose.) However, the GDSS was used during the transition to process seven events consisting of general staff information and press-release-oriented questions and answers. The system housed the original request (sometimes handwritten), all discussions, and the final approved document. These actions were handled in a timely and effective manner. Examples of Y2K team goals, results, and user responses are shown in the accompanying chart.

Conclusion

Electronic collaboration has enormous potential for certain aspects of DOD staffing and coordination. For the DOD Y2K effort, GDSS gathered and disseminated quality information, created a flexible response framework, and managed rapidly changing information. GDSS worked during the Y2K transition because the system was simple enough that it did not get in the way of OSD's discourse, yet provided a unique framework and capability for coordinating responses. The key lesson learned was that information shared with group systems made monitoring and managing more efficient and effective for everyone.

DOD responded to the challenge of the Y2K transition with flexible and responsive consequence management. This capability reduced redundant efforts, provided rapidly consolidated answers, and eliminated formal white papers and approvals. GDSS provided a mechanism to connect people with the information and technology necessary to succeed. The success of the program suggests a model for bringing together members of a hierarchical and geographically dispersed organization to collaborate on problem solving.

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APG's INTERNATIONAL IMAGING CENTER SUPPORTS MILITARY TESTING WITH CUTTING-EDGE TECHNOLOGY

Michael Cast

Introduction

Imagine being able to clearly read the stenciled letters on an artillery or tank round as it hurtles downrange at several thousand feet per second, or to see fine details within an explosion that lasts a fraction of a second. The International Imaging Center (IIC) at Aberdeen Proving Ground (APG), MD, makes challenging feats such as these possible with a large array of state-of-the-art digital and film cameras. In addition to using high-tech imaging equipment to rapidly provide images and information about the performance of weapons and other military hardware during tests, the IIC offers a wide range of photographic, graphic, and multimedia services.

With a workforce of approximately 50 photographers, electronic and lab technicians, and multimedia specialists, the IIC primarily supports military customers using the ranges and test facilities of the Aberdeen Test Center (ATC), an Army Developmental Test Command technical center located at APG. In addition, the IIC offers its products and expertise on a cost-reimbursable basis to various military organizations, research facilities, and government agencies.

IIC Chief David Jennings said that IIC basically has three main areas of expertise: technical photography, multimedia production, and image processing. He added, "The main thrust of the center is technical photography ... to provide high-speed and ultra-high-speed imaging throughout the visible and invisible spectrum."

Technical Photography

To accomplish this, the Technical Photography Team has sophisticated imaging systems, some of which operate in "extremely hostile ballistic environments," said Team Leader Mark Stern. A laser illumination system, for example, enables cameras on ranges to capture images of ultra-high-speed events such as shaped-charge explosions, threat and target interaction, and dual-warhead timing verifications. An IIC digital imaging system can capture these events at a rate up to 100 million frames per second. High-speed film cameras, both 16mm and 35mm, can record events at 40,000 frames per second. For some tests, the IIC uses cineradiography, a process that

ATC employee Brett Patterson adjusts the digital camera to focus on a mirror above the protected armor plate. Camera is aimed at a mirror to "look down" the barrel of a tank gun to record the flight of a projectile as it appears to come directly at the camera.

High-speed image looking down the barrel of a gun. Camera is positioned safely behind an armor plate under the line of fire with the lens aiming at a mirror to record the sabot separation as the projectile clears the fireball.

enables testers to obtain X-ray images to reveal information that other types of photography cannot record.

The images provided by these systems enable test customers to see the performance characteristics of small- and large-caliber projectiles—in the bore, exiting the muzzle, during flight trajectories, and upon impact with the target. In other tests, the images enable testers to gauge the ability of armored vehicles to withstand the impact of projectiles or provide a look at the performance of various components of military vehicles or other equipment.

IIC photographers also use gyrostabilized cameras to record air-to-air and air-to-ground tests, and night-vision systems to record tests in low-light conditions. For underwater images, the IIC has a photographic diving team whose members are certified to dive to depths up to 130 feet. Like other IIC photographers and video crews, this team is in demand to support customers worldwide. In addition to documenting military testing, IIC divers produce underwater footage for government travel bureaus.

Transitioning To Digital

The current trend at IIC and elsewhere is to transition from film photography to digital imaging where possible. Because of the expansive testing performed at ATC, IIC has one of the most diverse collections of digital imaging systems in DOD. One reason for this diversity is IIC's continuous replacement of film cameras with digital cameras—and not just consumer model versions, but high-end systems.

The benefits of using digital cameras include reduced time to attain results, substantial cost savings, and reduced environmental impact. Film photography is labor intensive because the film must be changed after shooting 100- or 400-foot rolls. The test must be stopped while the film is changed. Then the film must be sent to the lab for processing before the test resumes to ensure everything worked correctly. This leads to hours of downtime with an entire crew standing by.

With high-speed video, engineers can play back the video immediately, allowing customers to make decisions whether to proceed with the test. This can result in significant cost savings. Stern noted, "We might have fired 30 to 50 rounds in a day, only to find later there was something wrong with the rounds, wasting the labor and costs for firing them. Now we can see if there is a problem after firing one round and stop if there is."

Drawbacks to going completely digital are the initial outlay for equipment, which is substantial for the high-performance systems needed, and the inability of many currently available systems to provide the fine-detail resolution needed for some images.

"A lot of the photos we're taking are technical, so we're not looking for anything artistic, but photos that would show cracks in a metal casing," Jennings said. "The resolution becomes very critical, and the holdup in relinquishing the film-based motion-picture cameras is that some tests require very high resolution to see very small parts," he added.

Multimedia Productions

Although technical photography on ranges is not expected to reveal artistry, IIC employs photographers, graphic artists, and multimedia specialists who are imaginative and produce high-quality and accurate visual images, reports, and presentations.

A group that worked at IIC years ago realized the need to record data and use it to produce video and multimedia briefings and test reports. Once people saw the quality of this work, a whole production group evolved. This production group now films command videos. Additionally, they are often called upon to film video documentaries of testing worldwide. In the past 6 months, these video crews have traveled as far away as Korea and Kosovo.

IIC video command briefing customers include ATC, the U.S. Special Operations Command, and the Army Medical Research and Materiel Command. IIC and its multimedia group

Specially designed blast housings and ruggedized cameras are used to document extreme testing at ATC.

also produce interactive computer CDs that include training programs to teach soldiers how to install combat-identification panels on tracked and wheeled vehicles. Further, the multimedia team produces marketing presentations and creates Web sites for customers.

IIC graphic designers produce original technical art and illustrations using traditional "brush-and-palette" methods, as well as state-of-the-art computer systems and equipment. Graphic work includes conceptual depictions of weapon systems and two- and three-dimensional computer-generated illustrations that support exhibits, publications, and presentations.

The images produced by photographers using film and digital cameras are processed and printed in IIC's image-processing lab. In addition to making prints of various sizes from film and digital images, the lab produces photo CDs and offers other customer services. Like the IIC in general, the image-processing lab is transitioning from film-based processing and printing and expanding its digital support capabilities, while retaining the ability to provide traditional film-based services. One way the lab plans to bridge this gap is by acquiring a new printer/processor system, said Robert Hagan, Head of the Image-Processing Group.

If funds can be attained to acquire this new system, it will pay for itself by saving thousands of dollars in chemical costs, as well as costs associated with meeting stringent environmental regulations. The system uses a new process for photo chemistry that eliminates the need for measuring, mixing, or pouring chemicals. The system also prevents spills and waste from mixing too much chemical. It prints images from both film and digital cameras. Images from digital cameras can be directly input into the system and improved with the aid of a computer before printing.

Conclusion

IIC personnel participate in conferences and trade shows to stay abreast of cutting-edge technologies that are part of the information-age revolution. As the Army systems being developed grow ever more technically sophisticated, so must the technologies used to test them, including the imaging technologies that support the tests.

MICHAEL CAST is a Public Affairs Specialist at the U.S. Army Developmental Test Command, APG, MD. He has a B.S. in journalism from Arizona State University, College of Public Programs. For nearly 20 years, Cast has held various Army positions in writing, editing, and photography.

FROM THE DIRECTOR ACQUISITION CAREER MANAGEMENT OFFICE

I am pleased to congratulate the first graduates of the Competitive Development Group (CDG) Program, year group (YG) 97. The orientation for the YG01 CDG was held the week of Aug. 7, 2000, in the National Capital Region in Springfield, VA. Be sure to read the article on the YG01 CDG orientation in the upcoming November-December issue of *Army AL&T* magazine. I would also like to take a moment to recognize our two new regional directors: Sandra Long, National Capital Regional Director; and Kelly Irvin, Northeast Regional Director. They join Maxine Maples, Southern Regional Director, as the three Regional Directors for Acquisition Career Management. An expanded article on the new regional directors follows. The regional directors work closely with the acquisition career managers (ACMs), and under our new regional framework, ACMs will provide you with "help-desk" support. A contact list of all ACMs is on the Army Acquisition Corps (AAC) home page at **http://dacm.sarda.army.mil/contacts/CareerManweb.htm**.

I have emphasized several times in the past the importance of updated personnel files. AAC officers and civilians must pay close attention to the components of their board files to ensure accurate and updated information is presented. I highly recommend the article titled "Preparing For Army Selection Boards" on Pages 47-48 of this magazine. The FY01 Lieutenant Colonel/GS-14 PM/ Acquisition Command Board Results are also listed in this issue on Pages 48-50.

In October, the AAC Ball 2000 will be held at the Fort Belvoir Officer's Club. Once again, the event will coincide with the annual meeting of the Association of the United States Army (AUSA). If you have not made your reservations, it is not too late. To find out more about this dress blue/black tie event and to make your reservations, contact MAJ Jeannette Jones at **jonesjj@sarda.army.mil** or Jim Welsh at **welshj@sarda.army.mil**. I would also like to extend an invitation for you to stop by the AAC display at the annual AUSA meeting, Oct. 16-18 at the Marriott Wardman Park Hotel. You will also have an opportunity to visit our acquisition career management suite located in the Johnson Room at the hotel.

The Army Acquisition Workforce has grown since its inception, and there has always been some confusion as to its composition. I would like to direct your attention to the article titled "The New Workforce Definition" on Pages 33-34 of this magazine. The definition is really a work in progress, but the article provides some of the details on where we are in further defining the workforce to comply with Congressional direction.

COL Roger Carter
Director
Acquisition Career Management Office

Regional Directors Selected

The Army Acquisition Career Management Office (ACMO) is pleased to announce the selection of two new regional directors: Sandra Long as National Capital Regional Director and Kelly Irvin as Northeast Regional Director. They join Maxine Maples, Southern Regional Director, as the three Regional Directors for Acquisition Career Management. The regional directors work closely with the acquisition career managers (ACMs) and acquisition career management advocates, and are responsible for career development and regional workforce management.

Long, who was appointed National Capital Regional Director in April 2000, provides career management guidance and information dissemination to the National Capital Region's workforce, which encompasses more than 6,000 individuals employed at more than 20 organizations. One of her primary responsibilities is to raise the awareness of training and experience opportunities within the Army Acquisition Workforce.

Throughout her 20-year career with the Army, Long has served in a number of key positions. Most recently, she was the Proponency Officer for Communication and Computer Systems in the ACMO. Long holds a B.S. in information systems management and an M.S. in information systems. She can be contacted at **longs@sarda.army.mil**, (703) 805-1094, or DSN 655-1094.

Irvin was appointed as Northwest Regional Director in July 2000. She brings more than 7 years of experience in the Fort Monmouth Army acquisition community to this position. She provides career management guidance and information dissemination to more than 6,000 acquisition professionals in the region.

Irvin was one of the very first ACMs, formerly called Acquisition Workforce Support Specialists (AWSSs). Named the 1997 AWSS of the Year, she was honored for her dedicated service and for making significant improvements in communicating the Army Acquisition Corps vision to the workforce.

Irvin holds a B.S. in business administration from Georgian Court College, Lakewood, NJ, and an M.B.A. from Monmouth University. She can be contacted at **Kelly.Irvin@mail1.monmouth.army.mil**, (732) 532-1406, or DSN 992-1406.

CCAS Timeline, Tutorial Announced

To ensure timely compensation of all employees in the Civilian Acquisition Workforce Personnel Demonstration Project, a timeline for administering the 2000 Contribution-based Compensation and Appraisal System (CCAS) has been established. Please note that the 2000 CCAS rating cycle ends Sept. 30, 2000, and that pay pool payouts are scheduled for Jan. 24, 2001. The timeline is as follows:

- September 30: End of 2000 rating period,
- October 6: Deadline for employees to submit self-assessments to supervisors,
- October 20: Deadline for supervisors to complete assessments with *recommended* scores,
- October 23: First pay pool panel meeting,
- November 6: Second pay pool panel meeting,
- November 22: Pay pool manager approves scores and compensation, and
- January 24, 2001: Pay pool payouts.

If you need more information on the Civilian Acquisition Workforce Personnel Demonstration Project and CCAS, go to the AAC home page at **http://dacm.sarda.army.mil/demo**, click on **CCAS**, then **An Introduction to CCAS**. This is a self-paced tutorial on the demo project evaluation system that includes a discussion on

how employees are compensated from the pay pool. It also provides actual employee contribution objectives, employee self-assessments, and supervisor assessments from the 1999 CCAS rating period. In addition, an employee self-assessment guide, a supervisor assessment guide, and all CCAS forms are accessible on the Web site.

For additional information, please contact Jerry Lee at 703-604-7027 or **leeja@sarda.army.mil**, or Spencer Hudson at 703-604-7026 or **hudsons@sarda.army.mil**.

Acquisition Graduate Degree Program

Seventeen U.S. Army Acquisition Corps officers and one U.S. Navy Acquisition Corps officer received acquisition-related M.A. degrees at a commencement ceremony held May 31, 2000, at Fort Leavenworth, KS. Webster University conferred the degrees as part of the Acquisition Graduate Degree Program (AGDP). The following officers received M.A. degrees in procurement and acquisitions management: MAJ Eugene Barrett, MAJ Stephanie Foster, MAJ Michael Haider, MAJ John Hannon, MAJ Keith Harvey, MAJ Justin Hirniak, MAJ John Lazar, MAJ Andrew Lotwin, MAJ Brian Raftery, MAJ William Sheehy, MAJ Christopher Smith, and MAJ Todd Smith. In addition, the following officers were awarded M.A. degrees in computer resources and information management: CDR Prisca Perrault, MAJ Cris Boyd, MAJ Stanley Pustarfi, MAJ James Rowe, MAJ Philip Schoenig, and MAJ Phillip Viersen. Marcella Dill, Webster University Associate Vice President, Domestic Campus Administration, gave the commencement address.

AGDP is a fully funded program that allows selected Acquisition Corps students to complete an acquisition-related advanced degree concurrently with their attendance at the regular Command and General Staff Officer Course (CGSOC). Webster University is the AGDP provider and maintains a site at Fort Leavenworth. Acquisition Corps officers selected for the regular CGSOC and interested in the AGDP should contact the Chief of the Acquisition Education and Training Program at the U.S. Army Command and General Staff College, Fort Leavenworth at (913) 684-5330/5329 or DSN 552-5330/5329.

38 Graduate From MAM Course

Thirty-eight students graduated from the Materiel Acquisition Management (MAM) Course, Class 00-003, at the U.S. Army Logistics Management College, Fort Lee, VA. The course ran from April 3 to May 19, 2000. The graduates included two allied officers from Japan, one from Egypt, one from Korea, and one from the Philippines. The Distinguished Graduate Award was presented to MAJ Jeffrey K. Woods, who is assigned to HQ, Combined Arms Support Command at Fort Lee.

The 7-week MAM Course provides a broad knowledge of the materiel acquisition process. Areas of coverage include acquisition concepts and policies; research and development; test and evaluation; financial and cost management; integrated logistics support; force modernization; production management; and contract management. Emphasis is on developing midlevel managers to participate in the management of the acquisition process.

Research and development, testing, contracting, requirements generation, logistics, and production management are examples of the materiel acquisition work assignments being offered to these graduates. The names of the graduates follow.

CPT Waled Fathy W. Aly
MAJ Tsuneharu Aoi
CPT Jean R. Chausse
CPT Todd C. Cline
CPT Courtney P. Cote
MAJ Dennis V. Crumley
CPT Lambert D. Devries
MAJ Jessie Mario B. Dosado
CPT Thomas R. Flowers
CPT Lamar W. Hall
CPT Yee C. Hang
CPT Michael D. Hunter
CPT Tomotsugu Iizuka
CPT Bradley J. Killen
MAJ Kwang Y. Kim
MAJ Roy C. Manauis
CPT Michael S. Matt
CPT Thelonious F. McLean-Burrell
CPT Timothy R. McRae
CPT Robert J. Miceli
MAJ Yvetta A. Myers
MAJ Robert W. Myles Jr.
MAJ Michelle Nassar
MAJ Scott Nelson
CPT John O. Nugent
CPT John B. O'Neill
CPT David J. Pinter
CPT Eric C. Rannow
CPT Craig M. Ravenell
MAJ Kenneth L. Robertson
CW4 Steven L. Sanders
GS-13 John L. Scotton Jr.
CPT Robert W. Shelton
CPT Joyce B. Stewart
CPT James M. Thorne
GS-13 Kathy L. Williams
CPT Terry M. Wilson
MAJ Jeffrey K. Woods

PERSCOM Notes . . .

Preparing For Army Selection Boards

Department of the Army (DA) Officer Selection Boards are announced each fiscal year by the U.S. Total Army Personnel Command (PERSCOM). The individual military personnel (MILPER) message announcing a board provides critical deadlines associated with zones of consideration, officer evaluation reports (OERs), and other documents that must be forwarded to PERSCOM. After MILPER messages are officially released, they are posted on PERSCOM's Web site at **http://www-perscom.army.mil/tagd/fsd/milper.htm**. To view the tentative dates of Officer Selection Boards scheduled in FY01, go to the Web site at **http://www.perscom.army.mil/select/bdschd01.htm**.

Here are some things you can do to prepare yourself for this significant event in your career:

• Verify all entries on your Officer Record Brief (ORB). The ORB is a quick "snapshot" of the officer and sets the initial impression of your overall assignment history and qualifications. Duty titles with unusual acronyms are a problem on ORBs. Turn them into plain, understandable language. Remember, only one board member is in the Army Acquisition Corps. Ensure that your list of awards and badges is current. If there are any discrepancies, send a copy of your award certificate only (with the orders number and social security number written on it) directly to your assignment officer. There should be an Academic Evaluation Report or ORB to account for all active federal commissioned service. Please note, when board ORBs are printed, absolutely no data from your program, education, or total time for acquisition certification is shown. Certification is not a criterion for selection.

• Contact your local Personnel Service Center (PSC) or Military Personnel Office (MILPO) to update your e-mail address, home address, and duty and home phone numbers. This information is not part of the board ORB, but it must be current in PERSCOM's automated personnel network. Assignment officers need some way to contact you if there are any problems or questions regarding your board file. If your PSC or MILPO is unable to make these changes, contact the appropriate assignment officer listed below.

• Update your photo. New photos are required every 5 years; however, a new digital or computerized color image is recommended. Also, your photo should match your ORB (rank, awards, badges, etc.). Be sure your basic branch (not Acquisition Corps) is

on the photo in the personal data. In general, board members see an updated photo as initiative from officers who care about their file. Send two of your photos to your assignment officer in PERSCOM's Acquisition Management Branch (AMB). Do not allow the photographer to send in your photo. AMB's mailing address is U.S. Total Army Personnel Command, ATTN: TAPC-OPB-E (Assignment Officer's Name), 200 Stovall St, Alexandria, VA 22332-0411.

• Review your microfiche and tell us what is missing. There should be a set of orders on your fiche for every award and badge on your ORB (except those issued without orders; e.g., Army Service Ribbon or Overseas Service Ribbon). OERs and Academic Evaluation Reports should account for all your time in the military. Meritorious Service Medals and higher awards are critical. Ensure all qualification badges (ranger, airborne, etc.) are documented. Procedures for requesting a copy of your microfiche can be accessed at **http://www.perscom.army.mil/opod/fiche.htm**.

• Ensure your closeout and/or annual OER is submitted on time. The DA message announcing the board will specify the "through" date for closeout OERs and a "received no later than" date. Many senior raters hold OERs until the last minute, and some past OERs have arrived dangerously close to the cutoff date. Assignment officers are not part of the OER processing procedure. Your PSC or MILPO sends OERs directly to the OER Branch at PERSCOM. You can find out if your OER was received by the OER branch by sending a message to **tapcmser@hoffman.army.mil**.

If you have any questions, contact the appropriate Functional Area 51 assignment officer listed below:

COLONELS
MAJ Brian Winters, DSN 221-3090, (703) 325-3090, e-mail **wintersb@hoffman.army.mil**.

LIEUTENANT COLONELS (YGs 73-80)
MAJ Kim Hancock, DSN 221-3124, (703) 325-3124, e-mail **hancockk@hoffman.army.mil**.

LIEUTENANT COLONELS (YGs 81-84)
MAJ James Simpson, DSN 221-3129, (703) 325-3129, e-mail **simpsonj@hoffman.army.mil**.

MAJORS (YGs 80-87) (A-K)
MAJ Neil Thurgood, DSN 221-3128, (703) 325-3128, e-mail **thurgool@hoffman.army.mil**.

MAJORS (YGs 80-87) (L-Z)
MAJ Jeff Gabbert, DSN 221-5479, (703) 325-5479, e-mail **gabbertj@hoffman.army.mil**.

MAJORS/CAPTAINS (YGs 88-89)
MAJ Jon Rickey, DSN 221-2800, (703) 325-2800, e-mail **rickeyj@hoffman.army.mil**.

MAJORS/CAPTAINS (YGs 90-93)
CPT Mo Gutierrez, DSN 221-1474, (703) 325-1474, e-mail **gutierrem@hoffman.army.mil**.

FY01 White House Fellows Program

The President's Commission on White House Fellowships annually selects exceptionally promising individuals to serve as White House fellows. The White House Fellows Program is an opportunity for soldiers to receive unique training and firsthand experience in the process of governing the Nation. Fellows write speeches, help review and draft proposed legislation, answer Congressional inquiries, chair meetings, conduct briefings, and otherwise assist high-level government officials. In the past, fellows have worked for the vice president, the White House Chief of Staff, and the National Security Council.

Candidates for the White House Fellows Program must progress through a highly competitive process. Applicants are expected to have a record of career achievement, the skills necessary to serve at the highest levels of government, and above-average leadership potential. To be eligible for the program, officers must meet the following criteria:

• Be a U.S. citizen,

• Have no more than 19 years active federal commissioned service as of September 2001,

• Be available for a 2-year utilization tour following the fellowship,

• Be branch qualified at current rank,

• Have no adverse actions pending,

• Meet height and weight standards per Army Regulation 600-9, and

• Have a graduate degree.

The U.S. Total Army Personnel Command's (PERSCOM's) Acquisition Management Branch (AMB) will conduct a review board Oct. 11-12, 2000, to select Acquisition Corps officers for nomination to the program. The first step for interested Acquisition Corps officers is to submit a DA Form 4187, *Personnel Action*, requesting consideration for the program. The DA Form 4187 must be approved and signed by the applicant's field grade supervisor and forwarded to PERSCOM, ATTN: TAPC-OPB-E (Paula Bettes), 200 Stovall Street, Alexandria, VA 22332-0411. The suspense date for application submission is Oct. 4, 2000. Officers are encouraged to review and update their official military personnel file (on microfiche) prior to submitting their application. Applicants should also verify with their assignment officer that all college transcripts and a current photo are on file at AMB. A list of Acquisition Corps assignment officers is located at **http://www.perscom.army.mil/OPfam51/amb-staff.htm**.

PERSCOM Headquarters will forward Army officer nominations to the President's Commission prior to Feb. 1, 2001. Regional finalists will be selected in March, followed by the selection of national finalists in May. The President's Commission is scheduled to announce the selected fellows in June 2001. Once selected, the fellows will relocate to the Washington, DC, area to start the program. The fellowship year runs from September 2001 to August 2002. This is followed by a 2-year utilization assignment that will begin in September 2002.

Officers incur an active duty Service obligation (ADSO) for a period of three times the length of the fellowship. The ADSO begins the day after the fellowship is completed.

Additional information on the White House Fellows Program is available online at **http://www.whitehousefellows.gov/home.html**.

FY01 LTC/GS-14 PM/AC Board Results

The Acquisition Management Branch (AMB), U.S. Total Army Personnel Command (PERSCOM), recently completed an analysis of the FY01 Lieutenant Colonel (LTC)/GS-14 Product Manager (PM)/Acquisition Command (AC) Board results and overall command opportunity for Army Acquisition Corps (AAC) officers and civilians. The selection board was conducted Feb. 22–25, 2000, and the list of selectees was released July 13, 2000. The following paragraphs summarize the results and possible trends.

Overall Results

Board members reviewed the files of 255 AAC members. From this population, the board selected 54 principals for PM and AC assignments. The selectees included 48 officers, 2 civilians, and 4 officers who were revalidated. The overall selection rate was 19.6 percent. The military selection rate was 25.9 percent (48/187), and the civilian selection rate was 2.9 percent (2/68). Results by year group are as follows:

1984	1983	1982	1981	1980
3	32	9	3	1

Who Got Selected?

Forty-seven of the 52 selected officers (90 percent) and both of the selected civilians have master's degrees. Seven of the selectees (13 percent) were not previously selected for the resident Command and General Staff College. Both civilians (100 percent) and 32 of the 36 officers selected to be PMs (89 percent) had served at least 2 years in a program office, had major headquarters staff experience, and had worked in a variety of career-broadening positions. Ten of the 13 officers (77 percent) selected as contracting commanders have at least 4 years of contracting experience at the Defense Logistics Agency, the U.S. Army Materiel Command, the U.S. Army Forces Command, or in the Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology. One of the selected civilians was Corp Eligible, grade DB-03 (GS-13 equivalent). The other civilian was in the AAC, grade NH-04 (GS-14 equivalent).

General Observations

Consistently strong evaluations were common among selectees. Generally, officers are selected for command the first or second time considered. The two civilians selected for PM positions were being considered for the first time. Additionally, they made themselves competitive by expanding their training, education, and experience in a variety of jobs. The two civilians also had very strong comments on their Senior Rater Potential Evaluation (SRPE).

To be competitive for PM and AC assignments, officers should have program office experience. But there is no evidence that consecutive or repetitive program office tours better qualify someone for PM selection. Contracting officers require extensive contracting training and experience in pre-award and post-award contracting. Success in other acquisition positions enhances file strength.

Command Opportunity

The AAC continues to afford officers and civilians a healthy opportunity to command. Throughout the past 4 years, command opportunities for AAC officers compare favorably with the Army average of 10-14 percent.

Summary

Before future PM/AC boards convene, officers must devote time to personally "scrub" their Officer Record Brief and microfiche to ensure accurate information is conveyed to board members. The AMB will scrub packets for officers in the zone of consideration 90 days prior to the board convening. If your official photo is more than 3 years old, it needs to be replaced. Prior to taking a new photo, officers should check their awards, branch, U.S. insignia, etc. Attention to detail makes a difference.

To be competitive for early selection as a PM or commander, captains and majors should seek career-broadening experiences. With a limited number of positions in program offices available, PERSCOM will continue to rotate captains and majors at 24-month intervals to ensure there is a sufficient pool of experienced, branch-qualified officers for future PM and command positions. Officers wanting to be competitive for contracting commands should seek contracting officer positions in pre-award and post-award environments and contingency contracting officer assignments.

Civilians should also take time to ensure that their application package is complete and contains all required documents. Special attention should be given to ensuring the accuracy of data in the Acquisition Civilian Record Brief (ACRB). Dates in the ACRB should match dates in DA Form 2302, *Civilian Qualification Record*. "Fresh" ACRBs may be obtained from the Acquisition Career Managers and should be submitted with application packages. Any discrepancies in the record (such as missing evaluations) should be explained. Remember, the application package reflects your career and defines your training, education, and experience to the board. It is also important for civilians to stress to their supervisors the importance of the SRPE. Weak comments or the lack of comments contribute to the low selection rate for civilians.

FY01 LTC/GS-14 PM/AC Selectees

*All selectees are lieutenant colonels unless otherwise indicated.

Name	Branch/Series
Azemar, Jacques A.	EN
Bass, Joseph L.	QM
Bedell, Cynthia M.	CM
Biega, Michael J.	SC
Bryant, Thomas H.	AV
*Burke, Kyle T., MAJ(P)	TC
*Callahan, Michael O., MAJ(P)	FA
Cantor, Michael E.	AV
Conley, Mark A.	IN
Cottrell, Daniel T.	AR
*Cook, David A., MAJ(P)	AD
Curry, Virgil Jr.	AD
Dean, Charles E.	IN
Delaney, Michael J.	AV
Eberle, Nathan R.	AV
Gazzano, Lee D.	EN
Green, Allen L.	EN
Green, Dwayne S.	OD
Hansen, Jacob B.	OD
Hazelwood, Donald A.	AV
Hoppe, Williams C.	IN
Jennings, Theodore L.	EN
Johnson, Clarence E.	AD
Klein, Dale E.	SC
Kunkel, George D.	AV
Kwak, Michael J.	SC
Lambert, Charles S.	FA
Lehman, Greta P.	AG
Leisenring, Stephen B.	CM
*Lockhart, David E., MAJ(P)	SC
Lovett, Robert A.	AR
McDaniel, Michael A.	AR
McGuiness, John J.	IN
Miller, Christopher M.	AV
*Miller, Russell F. (CIV)	801
Miller, Scot C.	SC
Myrick, Paul R.	FA
Nulk, Raymond H.	OD
Nutbrown, Curtis H.	FA
Parker, James M.	AR
*Paul, Richard B. (CIV)	301

Pottinger, John M.	AD
*Rasmussen, Christopher M., MAJ(P)	AD
*Shufflebarger, Newman D., MAJ(P)	AV
Skinner, Eugene W. Jr.	AD
Stockel, Eugene F.	IN
Trang, Jeffrey A.	AV
Turner, Thomas E. Jr.	QM
Williams, Yancey R.	AR
Williamson, Michael E.	AD
Wilson, Jeffrey K.	OD
Wilson, John M.	AV
*Yacovoni, Philip M., MAJ(P)	QM
Yarborough, Michelle F.	AV

Acquisition Corps Accession Board Announced

The U.S. Total Army Personnel Command (PERSCOM) Acquisition Candidate Accession Board will be held Nov. 6-10, 2000, to review records of officers in year groups (YGs) 91-94 who want to join the Army Acquisition Corps (AAC). The primary YG considered will be 94. Officers in the other YGs will be accessed to fill valid vacancies within the AAC for these specific year groups.

A military personnel message announcing the board was distributed Armywide in July 2000. The message is posted on PERSCOM's home page at **http://www-perscom.army.mil/tagd/msg/2000.htm** and contains membership requirements and specific AAC application guidelines.

Interested officers are encouraged to update their Officer Record Brief and ensure a current photo is on file with their basic branch. Each officer should also review their microfiche well in advance of the board to ensure its accuracy.

Additional information on the AAC and the upcoming accession board is available on the Acquisition Management Branch Web page at **http://www.perscom.army.mil/opfam51/ambmain.htm**.

FY00 LTC Promotion Board Results

The FY00 Lieutenant Colonel (LTC) Promotion Board results were released in July 2000. The selection rate for Army Acquisition Corps (AAC) officers in the primary zone was 64.1 percent, while the selection rate for the Army competitive category was 71.7 percent.

Although the primary zone selection percentage was lower than the Army average, the number of AAC officers selected for promotion exceeded the board's requirement. The board was required to select a minimum of 38 fully qualified AAC officers for promotion. However, the overall competitiveness of AAC officers resulted in the board selecting almost three times the requirement—111 AAC officers were selected for promotion. This year's primary zone selection rate of 64.1 percent compares favorably with last year's rate of 55.7 percent. The overall Army average also increased from 68.8 percent to 71.7 percent.

Overall AAC Results

The FY00 LTC Promotion Board reviewed the files of 153 AAC officers in the primary zone. From this population, 98 AAC officers were selected for promotion to LTC. Thirteen AAC officers (8.6 percent) were selected from above the zone, and no officers were selected from below the zone.

Promotion Formula

A review of those officers selected for promotion by the board indicate the following formula for success:

LTC = Command and General Staff College (CGSC)
+ Successful Command
+ Consistent Center of Mass (COM)(+) performance
+ Job progression and diversity

Army CGSC

Sixty-four of 98 (65.3 percent) AAC officers selected in the primary zone attended the resident CGSC. Thirty-four of 98 (34.7 percent) AAC officers selected in the primary zone completed CGSC through nonresident studies. In contrast, 14 officers (9.8 percent) in the primary zone did not complete CGSC (either resident or nonresident), and none of these officers were selected for promotion.

Command

Company command reports appeared to be extremely important to board members. The majority of AAC officers selected for promotion received at least one Above Center of Mass (ACOM) Officer Evaluation Report (OER) as company commanders. These reports generally had either clear ACOM senior rater profiles and/or strong senior rater comments on an officer's potential. In general, AAC officers with more than one COM command OER were not favorably considered.

Consistent COM(+) Performance

Another important factor was consistent COM(+) performance throughout an officer's career. AAC officers selected for promotion generally had consistent COM(+)/ACOM OERs.

Job Progression

The last important factor was clear evidence of increased responsibility from one assignment to the next. OERs on selected officers generally showed increasing levels of responsibility from one assignment to the next, as well as acquisition diversity in assignments.

The New OER (DA Form 67-9)

Analysis clearly showed that the board placed significant importance on the new OER (DA Form 67-9). Eighty-nine of the 98 officers considered in the primary zone had at least one new OER. Sixteen selectees had three or more DA Form 67-9 reports. Ninety-one percent of those selected had at least one COM(+) OER. Sixty-two percent of those officers selected had at least one COM OER.

Bottom Line

The board based its decision on the "whole-person" concept that includes performance, qualifications (positions held, schools attended, etc.), and Army needs (functional area requirements). Further, the board demonstrated confidence in the new OER by carefully considering both the block-check and the senior rater comments.

A list of 108 AAC officers selected for promotion to LTC is shown below. The names of three officers selected for promotion were not available when this magazine went to press.

Amos, Vincent Antone	Best, Robert Francis
Ashworth, James Stuart	Bither, David Edwin
Barr, Matthew John	Bleckley, Dennis Richard
Bellizan, John Lindward	Borhauer, Rachel Diane
Belva, David Guynn	Brown, Clayton Edward

CAREER DEVELOPMENT UPDATE

Butler, Preston Albert Jr.
Campbell, Kelly Nicholas
Campbell, Larry Wilfred
Carpenter, Robert Cameron
Carter, Donald Kyle
Charles, Sherman Louis
Collins, Ethan
Coney, Jacklyn
Crouch, Thomas William
Dejong, Ronald Johannes
Deluca, Ralph Christopher
Dickens, Chailendreia Monique
Dietz, James Eric
Dolgoff, Scott Joel
Earl, Arthur John
Edwards, Keith Richard
Ellis, Carl Mason
Ernyei, Mark Anthony
Fahy, Stephen Robert
Finley, Alfonso Jay
Ford, William Michael
Fortier, Norbert Herve
Gallop, David Lewis
Giunta, Joseph Anthony Jr.
Green, William Leslie III
Haase, Thomas Kyle
Haffey, Paul Joseph
Hess, John Powers
Hilliard, Jay
Hodge, Tony Frank
Hoyt, Edward Elwyn
Iddins, Jeffrey Bert
Ikirt, Steven Clark
Jackson, Karen Jo
Jenkins, Kennedy Elwood
Jennings, Kevin Nathan
Jimenez, Anthony Rey
Kihara, Steven Wayne
King, Dion Joseph
Klumpp, Joseph Jerome
Lepine, Paul Raymond
Lopez, Steven Eric
Malatesta, Mark L.
Manning, Barry George
Marshall, Edward Francis III
Mason, Danny Thomas
Masterson, John Hilliard
Matthias, Gregory James
May, Marshall Kevin
McCormick, Daniel John
McCracken, Richard R. Jr.
McRae, Lawrence Wilbur Jr.
McVeigh, Bryan Jay
Mead, Timothy Guy
Mercer, Thomas Edward
Minear, Steven James
Moore, David Murdock
Morin, Roger Joseph
Mullins, Freddy Wayne
Munn, Randy Wayne
Myers, Roger Eugene
Nagel, James Roger
Nichols, Richard Ervin Jr.
Nicolella, Anthony John
O'Connell, Lynn Hamilton
O'Day, Sean Patrick
Oelberg, Gregory Porter
Ordonio, Robert Romero
Owens, Michael Paul
Oxford, John Raymond Jr.
Pellicci, Jack Anthony Jr.
Presgraves, Donald Cawood
Ramsey, Andrew Roland
Rice, David John
Robinson, Keith Wayne
Roitz, Frederick Paul
Safford, Michael Robert
Savage, Roger
Schaller, Michael Edward
Shalosky, Christopher Angelo
Shifrin, Scott Erwin
Smith, Bobby Lee
Smith, Floyd Bernard Jr.
Smith, Gary Steadman Jr.
Smith, Perry Richard
Stewart, Gregory Edward
Stiefel, Jeffrey Ira
Tobin, Vincent Michael
Tubell, Wallace John Jr.
Vaglia, James Arthur
Vanrassen, Michael Jeffery
Vollmecke, Kirk Fredrick
Walsh, Damon Thomas
Warren, Matthew
Wehrli, Friedrich Nikolas
Williford, William Shugart
Winters, Brian Christopher

AWARDS

Pulford Gets Hite Award

MAJ Scott A. Pulford received the LTG Ronald V. Hite Award at a ceremony held May 31, 2000, at Fort Leavenworth, KS. Established in March 1999 by LTG Paul Kern, Director, Army Acquisition Corps (AAC), the award recognizes the outstanding Army Acquisition Corps student attending the regular Command and General Staff Officer Course (CGSOC). The award was presented by COL William R. Pulscher, Director, Acquisition Center, U.S. Army Operations Support Command. Pulford received a plaque, a three-star AAC coin, and a congratulatory note from Kern. Pulford's name was also placed on a plaque that is permanently displayed at the U.S. Army Command and General Staff College.

Pulford was selected from 54 AAC students attending the 1999-2000 CGSOC. All AAC officers attending the regular CGSOC are eligible for the award. Selection is based on a student's grade point average, contribution to group work, leadership skills, written and oral communications, research ability, recommendation from the student's academic counselor or evaluator, and consensus of the acquisition faculty. Hite, for whom the award is named, is a former AAC Director who was instrumental in establishing the Acquisition Education and Training Program (AETP) at the U.S. Army Command and General Staff College.

The AETP offers career-enhancing instruction in a distinct Acquisition Corps area of concentration within CGSOC. In addition, the AETP offers the opportunity to participate in a fully funded M.A. degree-producing Acquisition Graduate Degree Program in conjunction with the CGSOC. The AETP was featured in an article in the July-August 1998 edition of *Army RD&A*.

MAJ Pulford's next assignment is with the U.S. Army Simulation, Training and Instrumentation Command in Orlando, FL. He will serve as Project Director, Advanced Gunnery Training System.

Packard Award, DAE Certificate Presented

Dr. Jacques S. Gansler, Under Secretary of Defense for Acquisition, Technology and Logistics, selected the Medium Tactical Vehicle Replacement Program Team as the 2000 Army winner of the David Packard Excellence in Acquisition Award. The team was nominated by MG John F. Michitsch, Program Executive Officer, Ground Combat and Support Systems, and honored during an Acquisition and Logistics Reform Week ceremony at the Pentagon earlier this year. Through a "partnering with industry" concept, the joint Army and Marine Corps team developed a cost-effective, state-of-the-art system to replace its current fleets of M809 and M939/A1 medium tactical trucks. The David Packard Award is the highest acquisition award given by DOD, and recognizes teams that have made highly significant contributions that demonstrate exemplary innovation and best-acquisition practices.

Dr. Gansler also presented the Defense Acquisition Executive (DAE) Certificate of Achievement to the U.S. Army Tank-automotive and Armaments Command's Armament Research, Development and Engineering Center (TACOM-ARDEC) Acquisition Center Field Artillery and Fire Control Group. Specifically, the Field Artillery and Fire Control Group's Contracting Team was commended for executing an innovative and streamlined process that exceeded customer expectations, reduced costs, and improved efficiency in the production and fielding of systems for the M109 (Howitzer) Paladin. The DAE Certificate of Achievement recognizes organizations, groups, and teams for exceptional contributions in reducing life-cycle costs and/or improving DOD's acquisition systems and programs.

FROM THE ACQUISITION REFORM OFFICE . . .

Note: The point of contact for the following acquisition reform articles is Monti Jaggers, (703) 681-7571, ***monteze.jaggers@saalt.army.mil.***

About Roadshow 2000

"Roadshow 2000," sponsored by the Department of the Army (DA), is comprised of six seminars being presented this year for members of the Acquisition and Logistics Workforce at their home stations. Other similar seminars, also sponsored by DA, have been presented since 1992 and have addressed topics such as performance specifications, best-value contracting, logistics streamlining, total ownership costs, and other acquisition streamlining tools and techniques. Roadshow 2000 seminars assume that these tools and techniques are well-understood and focus on a more business management-oriented perspective.

Roadshow 2000 seminars emphasize looking beyond profits and fees to find the key interests that motivate the very best suppliers to do business with the government. This year's roadshow seminars also address procurements based on the market value of goods and services and taking better advantage of commercial markets and practices. Additional topics will be selected by sponsoring agencies to meet local training needs.

The Roadshow 2000 format is similar to that used at seminars conducted by professional trainers. The trainers present in-depth workshops developed for and approved by DOD agencies, and are able to expand on the topics they present. Roadshow 2000 attendees are expected to pick topics of interest to them and to actively participate in the seminars. The entire roadshow series is devoted to institutionalizing acquisition reform tools and techniques and encouraging attendees to adopt a higher level business-management perspective.

Advanced Acquisition Reform Training

Advanced Acquisition Reform Training 3 (AART3), the latest iteration of continuing education efforts for the Army's contracting professionals, is currently being provided at various installations worldwide. This 3-day workshop, designed to strengthen and fine-tune key contracting skills, has been presented to members of the Acquisition Workforce in Virginia, Texas, Maryland, New Jersey, Korea, Hawaii, Germany, and Puerto Rico.

The core subjects—incentivizing contractor performance, negotiation skillshop, and outcome-based source selection—are designed to emphasize the role of the contracting officer as a business advisor to the customer. Incentivizing contractor performance addresses the use of commercial business practices to look beyond profits or fees for contractor performance incentives. The negotiation skillshop addresses negotiation strategies and tips and includes a mock negotiation exercise. Outcome-based source selection focuses on helping the customer determine the desired outcome of the procurement action and structuring the procurement to satisfy that outcome.

The curriculum also includes 10 electives on topics such as commercial business practices and exercising the multistep advisory process. These options allow the principal assistant responsible for contracting and the director of contracting to tailor the workshop to meet specific installation training needs.

CECOM Pioneers Best-Value Reverse Auctioning

The U.S. Army Communications-Electronics Command (CECOM) Acquisition Center has successfully demonstrated best-value reverse auctions. Several activities and companies are marketing or have tested reverse auctions where the lowest price wins. CECOM helped develop commercial software to allow reverse auctioning based on price and nonprice factors.

The person running the auction can determine the importance of each factor such as delivery schedule, computer speed or memory, or warranty. The reverse auction can then emphasize a number of factors. CECOM has successfully tested the new software with several live auctions that resulted in significant quality increases and price reductions.

CECOM has placed this new software on the Army Single Face to Industry Web site so the entire Army can use it. This Web site is at **http://acquisition.army.mil/default.htm**. Many companies that offer only low-bid reverse auction software charge a percentage of sales whereas CECOM's more extensive program is available to the entire Army at no cost.

This innovative e-commerce tool leverages advanced search, selection and comparison technologies, and leading-edge functionality to improve the Army's interactive business opportunities page. This new process is a significant step toward realization of the Army and CECOM Acquisition Center's goal to make online acquisition more efficient and cost effective.

Feedback from industry has been extremely positive. Sellers were pleased with the ease of navigating through the site and posting prices.

This initiative indicates the CECOM Acquisition Center's intent to further pioneer business innovations that help the command produce top-value products at the best possible price.

COSSI Success Story For Army Aviation

A Switchable Eyesafe Laser Rangefinder/Designator (SELRD) upgrade for the Kiowa Warrior and Apache helicopters has been developed by Kollsman Inc. as a cost-sharing initiative under the Commercial Operations and Support Savings Initiative (COSSI) Program. By leveraging the design of common modules from the Comanche, significant cost savings were realized in the development phase. The SELRD upgrade design achieves a high degree

of commonality in the Comanche, the Kiowa Warrior, and Apache laser designs. Leveraging the production buys of common modules and components across platform applications will generate significant savings in the average unit production price of the laser through efficiencies gained in production and in lower component costs from suppliers.

Operations and sustainment (O&S) costs will also be reduced through the modernization of the aging laser designators in the OH-58-D Kiowa and the AH-64A/D Apache Attack helicopters. The laser designators in both systems are unreliable and their parts are obsolete. The COSSI Program qualified the laser diode stacks to meet the Comanche and Kiowa Warrior/Apache SELRD laser specifications. The Kiowa Warrior SELRD specification for mean time between failure (MTBF) is 5,000 hours—an improvement of more than 15 times the existing lasers' MTBF performance. The U.S. Army Aviation and Missile Command (AMCOM) Value Engineering Group estimated the SELRD upgrade would generate more than $100 million in O&S savings in 10 years. Even greater savings were estimated for the Apache SELRD Program (more than $130 million).

The AMCOM Modernization Through Spares Office endorsed the COSSI Apache SELRD Program and committed to initial stage II production funding for the laser. More rapid O&S savings will be achieved if sufficient funding is available to include the SELRD in the Apache Target Acquisition Designation System/Pilot Night Vision System Modernization Program.

AMCOM'S Quest For Paperless Contracting

The U.S. Army Aviation and Missile Command (AMCOM) Acquisition Center continues the quest to convert contracting from a paper-based system to a digital operation to reduce cycle time and operational costs. To achieve this goal, a Paperless Contracting Integrated Product Team was established to examine current business practices and receive ideas from other commands. The team was comprised of program executive office customers; deputies for systems acquisition (DSAs); and representatives of the Integrated Data Environment Management Office, the Corporate Information Center, and the AMCOM Acquisition Center.

Technical support personnel developed an application called the Acquisition File Transfer Utility to allay security concerns associated with e-mail transmissions. This proposed solution underwent pilot testing with participation from each of the PEOs and DSAs as well as contracting offices that supported these customers. The application is now available for use by major item teams and their customers. During pilot testing, users of this application suggested 11 improvements, which are currently being programmed. At the conclusion of the programming effort, these upgrades will be tested by users and the software will be provided to the workforce. The application also includes a feedback feature that facilitates sharing additional enhancement ideas. Another integral feature of this application is security protection through use of a Web site that encrypts data that are being transmitted through a 128-bit socket layer.

Another initiative that facilitates conversion to paperless contracting is posting documents to the AMCOM Acquisition Center home page. Solicitations are also posted to this home page if the contract specialist elects this option. For technical data packages that are competitive in nature, a link is provided to help prospective contractors make informed decisions on competing on individual actions. These solicitations are also linked to the Army Single Face to Industry Web site that displays all Army solicitations. This Web site is at **http://acquisition.army.mil/default.htm**. Search features permit prospective offerors to select classes of items or locations in which they have an interest. In addition to contracts and solicitations, synopses are also displayed on the AMCOM Acquisition Center's home page. Another future paperless acquisition effort is the addition to the Procurement Automated Data Document System (PADDS) of the Vendor Response System, which will permit prospective offerors to electronically submit proposals to the AMCOM Acquisition Center.

AMCOM Uses Innovative Contracting Approach

The U.S. Army Aviation and Missile Command (AMCOM) Acquisition Center has used an innovative contracting approach to award two 5-year spares contracts to Raytheon Electronic Systems Co. in support of the PATRIOT Missile System. The maximum potential value of each contract is $166 million for the first and $149 million for the second. The two contracts will provide continuous support for the PATRIOT Missile System, allowing maximum flexibility for determining the quantity to be ordered at any time during the 5 years. The contracts will also reduce administrative lead time to less than 30 days for each of the line items.

Profit will be determined based on past delivery performance. This will motivate the contractor to reduce actual production lead times, thereby earning a higher profit to be applied to subsequent orders. The profit rate will be determined by the quarterly production lead-time report, which includes PATRIOT and Hawk missile spares orders, excluding concurrent buys. Raytheon's average production lead time during the previous quarter will determine the profit to be applied to orders issued under the contract during the subsequent quarter.

Key benefits of 5-year contracts are customer flexibility in expediting ordering of specific quantities and reduced administrative lead time for all of the line items. The lead-time reduction significantly lowers the dollars required for inventory investment. Other benefits include the following:

- Operational readiness is maintained.
- Response time from identification of requirement to contract award is cut to 1 month from the typical 5-month administrative lead time.
- Cost of inventory is significantly reduced because of rapid response time and the ability to order as required over a 5-year period.
- Improvement in customer satisfaction. These contracts allow immediate ordering of spares as frequently as needed.
- Resource Utilization. Five-year contracts covering multiple requirements versus individual contracts for each item affords more efficient use of personnel.

Fort Hood Reinvents Commercial Activities Program

Through a partnering initiative, the Commercial Activities (CA) Program at Fort Hood, TX, has been reinvented. The goals of the CA Program are to implement the national policy defined in the Office of Management and Budget Circular A-76 and to obtain effective service through competition. Fort Hood formed a partnership between the individuals involved with in-house governmental activities and the support contractor who provided the products used in the cost competition. Assisted by a professional facilitator, the Fort Hood CA Partnering Team implemented a partnering program that highlighted program expectations, issues, concerns, and problems. When problems were discovered, the CA Team developed action plans to identify solutions. Moreover, the CA Partnering Team established an issue resolution process and a partnership monitoring plan. The monitoring plan provided team members with a vehicle to uncover program-delaying problems before they reach the crippling stage. When a critical problem surfaced, the issue resolution process provided team members with an instrument that helped solve the problem in a timely manner. The partnering agreement between the government and the support contractor was the first one established by the Fort Hood contracting community.

To show how partnering saved taxpayer dollars, the team compared the prior CA studies conducted at Fort Hood and the FY99 CA studies. Contractor support for these prior studies lasted 15 months on average. The average cost per manpower space for these prior studies amounted to $1,400. In contrast, the average cost for all of the studies initiated in FY99 was $1,330 per manpower space, resulting in a $70 per space savings. Thus, based on the 474 manpower spaces studied, this amounted to a total savings of $33,180. Additionally, the contractor study support effort for the FY99 studies lasted only 11 months rather than the 15 months allocated before partnering was implemented. This equated to a 4-month savings achieved through the use of a formal partnering program.

LETTERS

Dear Sir:

I am an artilleryman, yet I make it a point to read all the military periodicals I can to stay current with the Army as a whole. I was reading the article "Maintaining the Health and Well-Being of Senior Leaders..." written by several authors in your May-June 2000 issue. I stopped reading after finishing the paragragh "Defining Senior Leaders." How can a study be complete without assessing command sergeant majors, first sergeants, and platoon sergeants? We are the "backbone," the beasts of burden who get the job accomplished. Try to live the life of an operations sergeant, who with the S-3, is truly responsible for what happens in a battalion day to day. There is an old saying: "I didn't build the train or the tracks. I'm not the engineer; I don't drive the train. I'm not the conductor either. But let this train go off the track and see who gets the hell." First and second lieutenants are monitored for stress but not first sergeants or platoon sergeants. We are the ones with 16 years or more under our belts. We don't have fancy diplomas to fall back on when the axe falls. We don't get paid half as much as officers with the same time in the Army as us. You want to see stress? You want to know how to improve the well-being of a "leader"? Then follow me around. Monitor me, just don't put the monitors anywhere near my torn knees, rebuilt shoulder, or sore back. Quiet Storm!

1SG George Gonzalez
HSB, 1st BN, 78th FA
Fort Sill, OK 73503
580-442-5580/6115
gonzalezg@sill.army.mil

Response:

Dear 1SG Gonzalez:

We agree that a study of senior leaders must include noncommissioned officers. And as we note in the "Future Work" section of the article, we intend to include command sergeant majors and first sergeants in future investigations. We are currently assessing the workload and PERSTEMPO [personnel tempo] of platoon sergeants (and junior enlisted soldiers) in an ongoing study of the impact of high OPTEMPO [operational tempo] on soldier and unit readiness.

MAJ Carl A. Castro
Commander
U.S. Army Medical Research Unit-Europe

NEWS BRIEFS

Single Stock Fund Effort Revolutionizes Army Logistics Processes

An intensive effort managed by the Department of the Army Single Stock Fund Project Manager is revolutionizing Army logistics processes. The U.S. Army Communications-Electronics Command (CECOM), a major subordinate command of the Army Materiel Command (AMC), has a key role in this effort. CECOM is responsible for implementing the Engineering Change Proposals (ECPs) within the Commodity Command Standard System (CCSS) and the AMC Installation Supply System (AMCISS) that are required to support the Single Stock Fund (SSF) business rules and functionality.

This massive software engineering effort to integrate and consolidate the Army's logistics processes and financial accounting functions under a single manager will significantly streamline inventory management and requisitioning procedures. Martin Wolfe, Chief of the Business Systems Directorate of the CECOM Software Engineering Center said, "[ECPs] will improve asset visibility, improve efficiency in the Army requisitioning process, and significantly reduce costs." He added that the overall goal of this program is to achieve a single point of sale and credit, and a single general ledger to improve management and budgetary control.

"We faced the challenge during the past year of adapting the SSF new business rules and implementing required software changes within an extremely ambitious schedule set by the Army," Wolfe explained. "Adding to our challenge was the outsourcing of the work being performed by the two Central Design Activities in St. Louis, MO, and in Chambersburg, PA, who were responsible for implementing the SSF Engineering Change Proposals associated with CCSS and AMCISS. The uncertainties faced by the two Central Design Activities' employees and the associated workforce turbulence added to our challenge during this period," Wolfe added.

From September 1999 through June 2000, personnel associated with the SSF effort successfully managed and controlled the SSF software baseline, implemented the required software changes on schedule, and released the system for an operational demonstration at three sites.

"The success of the Single Stock Fund Program is directly attributed to both the dedicated, hardworking, and professional workforce as well as to the close working relationship that exists within the entire Single Stock Fund community," Wolfe said.

With completion of the transition of the two central design organizations' workload and personnel to the Wholesale Logistics Modernization Program (WLMP) contractor (Computer Science Corp.), the SSF effort affecting both CCSS and AMCISS will continue under the WLMP Program. "[The] CECOM Software Engineering Directorate will continue to support this very important program that began the revolution in Army's logistics processes," Wolfe emphasized.

PERSONNEL

Cuviello Takes Over As DISC4

LTG Peter M. Cuviello, former Commanding General, U.S. Army Signal Center and Fort Gordon, GA, has assumed new duties as Director of Information Systems for Command, Control, Communications and Computers (DISC4). He succeeds LTG William H. Campbell, who has retired.

A veteran of more than 31 years of active military service, Cuviello served earlier tours as Director for Command, Control, Communications and Computers, Office of the Secretary of the Army, Washington, DC; Director, J-6 (Communications), U.S. Southern Command, Quarry Heights, Panama; Commander, 3rd Signal Brigade, III Corps, Fort Hood, TX; and Deputy Director for Plans and Programs, Office of the DISC4, Office of the Secretary of the Army, Washington, DC.

Cuviello holds an M.B.A. in operations research systems analysis from the Florida Institute of Technology and a B.A. in political science from Canisius College. In addition, he has attended the U.S. Army War College and the Armed Forces Staff College, and has completed the Signal Officer Basic and Advanced Courses.

Listed among his military honors are the Defense Superior Service Medal, Legion of Merit with three Oak Leaf Clusters (OLCs), the Bronze Star Medal, the Defense Meritorious Service Medal, the Meritorious Service Medal with five OLCs, the Army Commendation Medal with three OLCs, and the Army Achievement Medal.

Miller Succeeds Maude As Assistant DCSPER

MG Geoffrey D. Miller, former Deputy Chief of Staff for Personnel and Installation Management, U.S. Army Forces Command, Fort McPherson, GA, has been assigned as Assistant Deputy Chief of Staff for Personnel (ADCSPER), Department of the Army. Miller succeeds MG Timothy J. Maude, who assumed new duties as DCSPER.

With more than 28 years of active military service, Miller served earlier tours as Commanding General, XVIII Airborne Corps Artillery, Fort Bragg, NC; Assistant Division Commander, 4th Infantry Division (Mechanized) and Deputy Commanding General, Fort Carson, CO; and Chief, Mobile Strike Force, U.S. Army Combined Arms Center, Fort Leavenworth, KS.

Miller holds an M.S. in education administration from the University of Southern California and a B.S. in history from Ohio State University. In addition, he has attended the National War College and the U.S. Army Command and General Staff College, and has completed the Field Artillery Officer Basic Course and the Armor Officer Advanced Course.

His military honors include the Distinguished Service Medal, the Legion of Merit with five Oak Leaf Clusters (OLCs), the Meritorious Service Medal with five OLCs, the Army Commendation Medal with OLC, and the Army Achievement Medal.

Army Acquisition Corps Reading List

LTG Paul J. Kern, Military Deputy to the Assistant Secretary of the Army for Acquisition, Logistics and Technology and Director of the Army Acquisition Corps (AAC), recommends the reading list shown below for AAC members. The *Army AL&T* editorial office welcomes book reviews on these publications. Please note that we have already received reviews of *Built to Last: Successful Habits of Visionary Companies,* by James C. Collins and Jerry I. Porras; *Hope Is Not a Method: What Business Leaders Can Learn From America's Army*, by Gordon R. Sullivan and Michael V. Harper; and *Leading Change*, by John P. Kotter. To preclude duplicate submissions, contact the *Army AL&T* editorial office prior to sending your book review. The phone number is (703) 805-1035 or DSN 655-1035. The e-mail address is **bleicheh@aaesa.belvoir.army.mil**.

• *The Innovator's Dilemma: When New Technologies Cause Great Firms to Fail,* Clayton M. Christensen, Boston: Harvard Business School Press, 1997

• *The Social Life Of Information,* John Seely Brown and Paul Duquid, Boston: Harvard Business School Press, 2000

• *Being Digital*, Nicholas Negroponte (edited by Marty Asher), Random House, January 1995

• *Built to Last: Successful Habits of Visionary Companies*, James C. Collins and Jerry I. Porras, HarperCollins, October 1994

• *Hope Is Not a Method: What Business Leaders Can Learn From America's Army*, Gordon R. Sullivan and Michael V. Harper, Broadway Books, October 1997

• *Leading Change*, John P. Kotter, Boston: Harvard Business School Press, August 1996

• *Sacred Cows Make the Best Hamburger*, JoAnn Roberts, Warner Books, January 1993

• *Unleashing The Killer App: Digital Strategies For Market Dominance*, Larry Downes and Chunka Mui, Boston: Harvard Business School Press, April 1998

New Rules for the New Economy

By Kevin Kelly, New York: Penguin Books, 1998.

Reviewed by Dr. Robert J. Bunker, Fellow, Institute of Land Warfare, Association of the United States Army.

Kevin Kelly, Editor-at-Large for *Wired* magazine, has years of experience with cutting-edge technologies and monitoring the hacker community. *New Rules for the New Economy* follows in the tradition of his earlier *Out of Control* as a groundbreaking work that addresses the influences of the new economy. This book is a must-read for those engaged in projects that focus on networked military forces and the revolutions in business and logistical affairs that will ultimately support those forces. The book also provides insight into establishing an eventual homeland Defense network based on experiments with the Terrorism Early Warning (TEW) Group initiative.

An alternative title for this stimulating work could be "The Care and Feeding of Networks" because of its practical emphasis in this regard. Because of its insights into the dynamics of networks, this book makes for a strong companion to Nichiporuk and Builders' *Information Technologies and the Future of Land Warfare*. These 10 new "Rules for the New Economy" comprise the focal point of each chapter of the book. Kelly identifies them as follows:

1) Embrace the Swarm. As power flows away from the center, the competitive advantage belongs to those who learn how to embrace decentralized points of control.

2) Increasing Returns. As the number of connections between people and things add up, the consequences of those connections multiply out even faster, so that initial successes aren't self-limiting, but self-feeding.

3) Plentitude, Not Scarcity. As manufacturing techniques perfect the art of making copies plentiful, value is carried by abundance, rather than scarcity, inverting traditional business propositions.

4) Follow the Free. As resource scarcity gives way to abundance, generosity begets wealth. Following the free rehearses the inevitable fall of prices, and takes advantage of the only true scarcity: human attention.

5) Feed the Web First. As networks entangle all commerce, a firm's primary focus shifts from maximizing the firm's value to maximizing the network's value. Unless the net survives, the firm perishes.

6) Let Go at the Top. As innovation accelerates, abandoning the highly successful in order to escape from its eventual obsolescence becomes the most difficult and yet most essential task.

7) From Places to Spaces. As physical proximity (place) is replaced by multiple interactions with anything, anytime, anywhere (space), the opportunities for intermediaries, middlemen, and mid-size niches expand greatly.

8) No Harmony, All Flux. As turbulence and instability become the norm in business, the most effective survival stance is a constant but highly selective disruption that we call innovation.

9) Relationship Tech. As the soft trumps the hard, the most powerful technologies are those that enhance, amplify, extend, augment, distill, recall, expand, and develop soft relationships of all types.

10) Opportunities Before Efficiencies. As fortunes are made by training machines to be ever more efficient, there is yet far greater wealth to be had by unleashing the inefficient discovery and creation of new opportunities.

Rule 7, From Places to Spaces, and rule 9, Relationship Tech., are the most significant dynamics mentioned because they conceptually support and are interrelated to the proposed "Bond-Relationship Targeting" (BRT) warfighting concept. This operational concept viewed from the prism of Kelly's work focuses on the spaces between things and R (Relationship)-Technology for targeting purposes. This one insight alone is of great value to advanced battlespace researchers.

A very useful bibliography is also included that lists 36 texts and Web sites related to networks and economics (business). The work can be finished in one sitting, but two to three reads are required to get the most out of the concepts and examples it provides. One of the most memorable examples used in the work

is that of early fax machines and how their value increased as the network (number) of fax machines increased. While not as profound as the "pin factory" example in Adam Smith's *Wealth of Nations*, the fax machine example shows how we are leaving an older economy in favor of one that differs greatly from the industrial capitalism and resultant mass public warfare of the past 2 centuries.

The Kinder, Gentler Military: Can America's Gender-Neutral Fighting Force Still Win Wars?

By Stephanie Gutmann, A Lisa Drew Book (Scribner), 2000

Reviewed by J. Michael Brower, a former analyst in the Army Secretariat at the Pentagon from 1991 to 1997 and an Air Force veteran.

Every journalist must inevitably heed the knock of opportunity. In Stephanie Gutmann's systematic trashing of the concept of women in the Armed Forces, that opportunity is the knocking down of her own sex. A *cause celebre* for conservatives with a penchant for the carelessly anecdotal, *The Kinder, Gentler Military* is a mocking caricature of female contributions to the American military. This book refutes the influences of technology on women-at-arms. In 300 pages of stepping repeatedly on the same rake, Gutmann creates a shrill, semiliterate condemnation of "girls" invading "this man's military."

This brutal banality of a book begins with nonmilitary veteran reporter Gutmann at Fort Jackson, SC, faulting the performance of women in basic training. The narrative then staggers into a tirade over the standard-lowering influence women have on military skills and decries pregnancy aboard aircraft carriers and other Navy vessels. Gutmann dumps morale problems, operational failures, technical difficulties, gender-related litigiousness, Tailhook '91, sexual assaults, and all forms of bad luck on the doorstep of females in the military, imperially concluding that we should throw more than half of them out of the Services. "There will be an outcry about 'taking a step back,' about discrimination," intones the author solemnly, "about lack of opportunity. The only appropriate answer is 'Too bad.'" This recommendation is given despite the author's concession only a few pages before that "women became an indispensable part of the U.S. Armed Forces a long time ago."

Gutmann is hostile to the world's historical paradigm, which integrates women into all areas of the world's militaries, including combat and submarine duty. Her book fails to recognize, and is actually too juvenile to even consider, the economic roots of the women's equality movement. The book overlooks that the economic gains of women and subsequent status have translated into political power that inexorably propels Servicewomen to the highest ranks in the military. She applauds that the question of combat will restrain them a while longer. Gutmann is utterly blind to the fact that what was once in the military a "privilege" for women (serving in their Nation's Armed Forces) is evolving into a *droit de femme*. Despite the hundreds of books and military studies to the contrary, Gutmann concludes that Servicewomen have helped undermine this readiness: "It was once a happy marriage: young men who like to risk their bodies and shoot and blow things up, and a society that was plenty happy to let them do it ... it served a special social good—besides keeping us free." Women, we are to understand, have ruined all that by systematically destroying society's angry young men.

Gutmann's assessment is that military "morale is at rock bottom," and has several "recommendations" for improvement (hold onto your seats!):

- Increase the number of "high school dropouts we currently accept" in place of women;
- Separate the genders in boot camp (observes Gutmann, "Maybe we could keep more women in drill sergeant school if they faced the prospect of drilling ... women only.");
- Reform gender integration by endorsing the concept that "The military world does favor men";
- Permit more criticism in the ranks of "gender-integrated training" and similar questioning of equality policy;
- Issue the Tailhook Association "an official apology" from the Commander in Chief and the Joint Chiefs regarding fallout from Tailhook '91;
- Revitalize the Peace Corps and distinguish "peacekeepers" from "warriors";
- Demand that all military Services be more like the Marines ("The Marines: Live like them") "because they are generally doing all right."

Such a belletristic, half-baked, and sexist *his-story* will eventually find its way off the few bookshelves it degrades and thankfully into the ashbin of literary history. *The Kinder, Gentler Military* is recommended for anyone seeking the obscurantist, reactionary, historically twisted, and hopelessly benighted view of Servicewomen in the U.S. military.

The Way of the Warrior: Business Tactics and Techniques from History's Twelve Greatest Generals

By James Dunnigan and Daniel Masterson, St. Martin's Griffin, 1998

Reviewed by LTC Kenneth H. Rose (USA, Ret.), Tidewater-Richmond Area Manager for WPI in Hampton, VA, and former member of the Army Acquisition Corps.

"We should run the Army more like a business" is not an uncommon statement, especially in the logistics and acquisition domains. The other side of the coin is the suggestion that businesses should be run more like the Army. This thought has been the subject of a variety of recent books with titles ranging from the somewhat stodgy to the downright silly. Among the pack, *The Way of the Warrior: Business Tactics and Techniques from History's Twelve Greatest Generals*, presents a fresh, engaging approach that is practical, instructive, and direct.

Authors James Dunnigan and Daniel Masterson present a comprehensive view of military leadership and management across the ages. They cite examples from antiquity (Alexander, Julius Caesar, Charlemagne), recent history (Genghis Khan, Edward III

of England, Gustavus Adolphus, Frederick the Great, Napoleon, U.S. Grant), and contemporary times (MacArthur, Patton, Schwartzkopf).

Each of these leaders is the subject of a separate chapter presented in a three-part format that discusses the context of the times, the challenge the leader faced, and the solution methods he employed. This standard format allows readers to compare situations and responses and to discover consistencies on the fly.

Throughout, the authors employ down-to-earth language and a casual style that draws contemporary readers into historical understanding. Use of terms such as "strategic vision," "follow the money," and "people skills" establish common denominators through which long-past actions gain relevance to today's times.

Readers will find some of the vignettes familiar and others surprisingly similar. As the book progresses, enduring principles begin to emerge that establish management foundations of timeless applicability and value. To reinforce this, the authors close with a wrap-up chapter that summarizes the best practices of the leaders discussed.

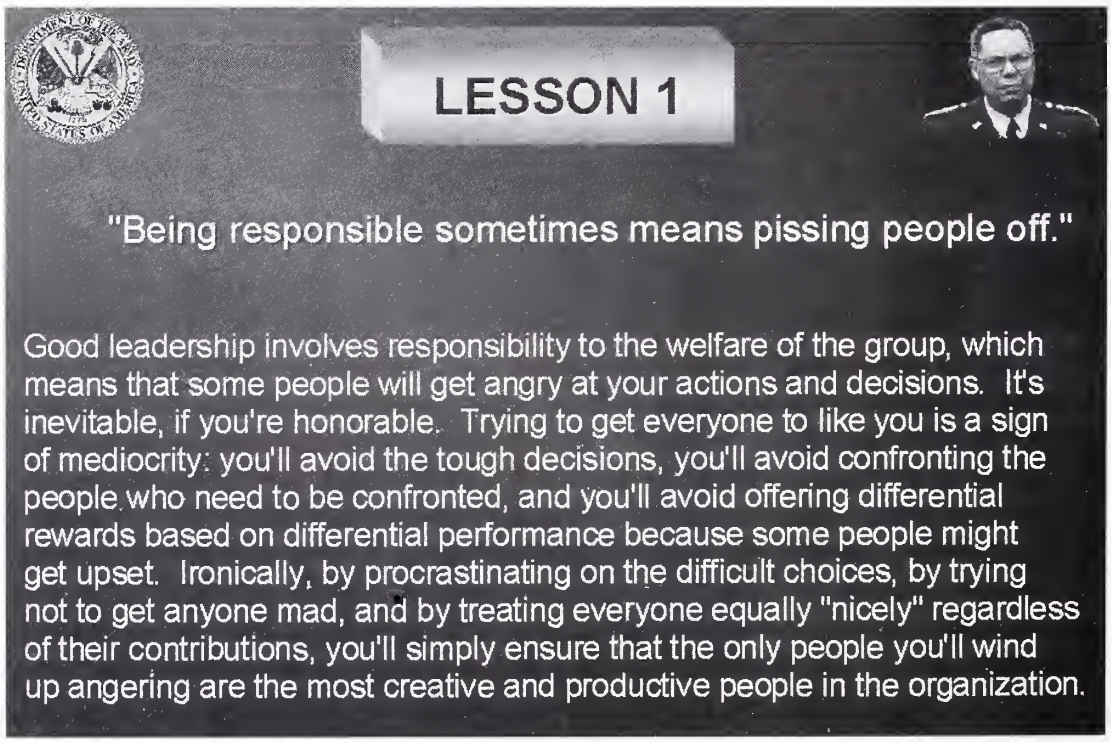
Communication is high on the list of 15 skills and techniques that include courage, leading by example, flexibility, decisiveness, vision, and self-development. The authors also mention a few less than desirable techniques such as pillage and extortion used to meet pressing financial challenges.

Although the book is a coherent compendium of military management, it falls short as a source of business tactics and techniques. The authors make minor linkages to business practice in an introductory chapter and throughout the text, but the book remains fundamentally a disclosure of military leadership and management in war and preparing for war. The authors make no effective translation to the business world of competitive strategy, return on investment, and shareholder value.

The Way of the Warrior: Business Tactics and Techniques from History's Twelve Greatest Generals is an excellent collection and analysis of time-proven military management practices. As such, it offers much to acquisition professionals. Readers seeking business tips should look elsewhere, perhaps to more traditional sources such as *Harvard Business Review*, *Sloan Management Review*, or *Academy of Management Executive*.

GEN Colin Powell On Leadership

The *Army AL&T* magazine staff was pleased to recently come across some very interesting and thought-provoking leadership lessons written by former Chairman of the Joint Chiefs of Staff GEN Colin Powell (USA, Ret.). Termed "A Leadership Primer," these 18 lessons will be published in future issues of *Army AL&T* magazine. We hope you enjoy them and welcome your feedback.



ARMY AL&T WRITER'S GUIDELINES

http://dacm.sarda.army.mil/publications/rda/

Army AL&T is a bimonthly professional development magazine published by the Office of the Assistant Secretary of the Army (Acquisition, Logistics and Technology). The address for the Editorial Office is DEPARTMENT OF THE ARMY, ARMY AL&T, 9900 BELVOIR RD, SUITE 101, FT BELVOIR VA 22060-5567. Phone numbers and e-mail addresses for the editorial staff are as follows:

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Purpose

To instruct members of the AL&T community relative to AL&T processes, procedures, techniques, and management philosophy and to disseminate other information pertinent to the professional development of the Army Acquisition Workforce.

Subject Matter

Subjects may include, but are not restricted to, professional development of the Army's Acquisition Workforce, AL&T program accomplishments, technology developments, policy guidance, information technology, and acquisition reform initiatives. **Acronyms used in manuscripts, photos, illustrations, and captions must be kept to a minimum and must be defined on first reference.**

Length of Articles

Articles should not exceed 1,600 words in length. This equates to approximately 8 double-spaced typed pages, using a 20-line page. **Do not submit articles in a layout format. ARTICLES CONTAINING FOOTNOTES OR ENDNOTES ARE NOT ACCEPTABLE.**

Photos and Illustrations

A maximum of 3 photos or illustrations, or a combination of both, may accompany each article. Photos may be black and white or color. **Illustrations must be black and white and must not contain any shading, screens, or tints. Submit illustrations in separate files from text.** Photos and illustrations will not be returned unless requested. **All scanned photos and illustrations must have a resolution of at least 300 dpi (JPEG or TIFF). Glossy prints of all photos should also be submitted via the U.S. Mail, FedEx, etc.**

Biographical Sketch

Include a short biographical sketch of the author/s that includes the author's educational background and current position.

Clearance

All articles must be cleared by the author's security/OPSEC office and public affairs office prior to submission. The cover letter accompanying the article must state that these clearances have been obtained and that the article has command approval for open publication.

Offices and individuals submitting articles that report Army cost savings must be prepared to quickly provide detailed documentation upon request that verifies the cost savings and shows where the savings were reinvested. Organizations should be prepared to defend these monies in the event that higher headquarters have a higher priority use for these savings. All Army AL&T articles are cleared through SAAL-ZAC. SAAL-ZAC will clear all articles reporting cost savings through SAAL-RI. Questions regarding this guideline can be directed to SAAL-RI, Plans, Programs and Resources Office, (703) 693-2685, DSN 223-2685.

Submission Dates

Issue	*Author's Deadline*
January-February	15 October
March-April	15 December
May-June	15 February
July-August	15 April
September-October	15 June
November-December	15 August

Submission Procedures

Article manuscripts (in MS Word), illustrations (300 dpi), and photos (glossy prints or 300 dpi JPEG or TIFF) may be submitted via e-mail to **bleicheh@aaesa.belvoir.army.mil**, or on a 3 1/2-inch floppy disk or a 100-MB ZIP disk via U.S. mail to DEPARTMENT OF THE ARMY, ARMY AL&T, 9900 BELVOIR RD, SUITE 101, FT BELVOIR VA 22060-5567. All submissions must include the author's mailing address, office phone number (DSN and commercial), and a typed, self-adhesive return address label.

Weapon Systems Handbook Presented

MG Joseph L. Yakovac Jr. (center), then Deputy for Systems Management and Horizontal Technology Integration, Office of the Assistant Secretary of the Army for Acquisition, Logistics and Technology (OASAALT), presents the photo montage used on the cover of the 2000 *Weapon Systems* handbook to Paul J. Hoeper (left), ASAALT, and LTG Paul J. Kern, Military Deputy to the ASAALT, during a ceremony this past summer. The montage is the work of well-known artist Rick McCleary. The handbook provides an overview of the best-available equipment for the year 2000 and outlines the major programs to equip the Army of the 21st century. It is a valuable and informative reference source for the Army, DOD, Congress, and industry.

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REPLY TO
ATTENTION OF
SAAL-ZAC

9 JUN 2000

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: Report to the Under Secretary of Defense (Acquisition, Technology and Logistics) on Continuous Learning for the Acquisition Workforce

In December of 1998, the Under Secretary of Defense (Acquisition, Technology and Logistics) (USD(AT&L)), issued a policy that established a standard for the participation of military and civilian workforce members in continuous learning activities. Army Implementing Instructions for the policy were issued in May 1999. (The policy and the instructions may be found at http://dacm.army.army.mil/policy.)

The continuous learning standard requires that acquisition workforce members certified in the positions they encumber shall earn a minimum of 80 Continuous Learning Points (CLP) every two years. The Individual Development Plan (IDP) was modified to record, monitor and report the attainment of the standard. I previously directed that all workforce members complete an IDP no later than June 30, 1999.

The OUSD (AT&L) requires an annual report, due this year on November 1, 2000, on the number of individuals achieving the standard. In order to have the most accurate information possible, it is imperative that you ensure that your workforce members participate in continuous learning activities and annotate accomplishment of CLPs and obtain supervisory approval on their IDPs not later than September 29, 2000. To assist you in assessing your progress and taking action where needed, current data for your organization is enclosed and will be reissued in early August. The final report will be based on end of fiscal year data, for which I will receive a report by command.

I encourage your full support of this important policy. Please feel free to contact the Acquisition Career Management Advocate or the Acquisition Career Manager in your region if you require support in educating the workforce on any aspect of this policy. (See http://dacm.sarda.army.mil for contact information.)

PAUL J. KERN
Lieutenant General, GS
Director
Army Acquisition Corps

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